Grand Canyon

National Park Service
U.S. Department of the Interior

Grand Canyon National Park

Environmental Assessment/Assessment of Effect

February 2003

North Rim Emergency Services/Wildland Fire Facility and Preservation Treatments of Exposed Frame Cabins

Grand Canyon National Park ● Arizona

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Summary

The purpose of this document is to disclose the expected effects to the human environment from the replacement of helibase support facilities, preservation treatments of exposed frame cabins for use by the wildland fire crew, and the construction and use of the proposed emergency services/wildland fire facility at various sites. The human environment is defined as the natural and physical environment and the relationship of people with that environment. The proposed activities are on lands administered by the North Rim district of Grand Canyon National Park in Coconino County, Arizona. The emergency services/wildland fire building and associated parking and access roads encompass approximately 0.8 ha (2.0 acres) and are located within the Bright Angel watershed.

Note to Reviewers and Respondents

This environmental assessment will be on public review for 30 days. If you wish to comment on the environmental assessment, you may mail comments to the name and address below, no later than 21 March 2003. Our practice is to make comments, including names and home addresses of respondents, available for public review during regular business hours. Individual respondents may request that we withhold their home address from the record, which we will honor to the extent allowable by law. **If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment.** We will make all submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public inspection in their entirety.

Please Address Comments to:
Joseph F. Alston, Superintendent
Grand Canyon National Park
Attention: Sara White, Compliance Officer
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Grand Canyon, Arizona 86023

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CHAPTER 1 - PURPOSE OF AND NEED FOR ACTION

INTRODUCTION

The National Park Service (NPS) proposes to replace an existing kiosk and storage building at the helibase, to construct an emergency services/wildland fire facility, and to preserve (rehabilitate, restore, or reconstruct) historic exposed frame cabins on the North Rim of Grand Canyon National Park (the Park), Coconino County, Arizona (Figure 1). These proposed activities implement a portion of the 1995 General Management Plan (GMP) for Grand Canyon National Park, which called for a new fire/emergency facility and improved housing at the North Rim. Construction of the facilities would start in late spring 2003.

PURPOSE AND NEED

The helibase office and material storage are currently housed in a small kiosk and an associated storage building near the existing helibase. These facilities were not designed for their current uses and are insufficient to provide necessary support services for helibase operations.

Emergency medical services (EMS) operations at the North Rim are currently housed in multiple facilities. The facility that houses the fire engine and ambulance was constructed in the 1930s and is too small for modern equipment. Portions of the fire engine have to be disassembled before it can be stored and reassembled before it can respond to a call. When the vehicles are in the building, there is no room to walk around the vehicles, provide service to the vehicles, or access other equipment in the building. The building is inadequately ventilated and violates National Fire Protection Act (NFPA) standards. Additional EMS operations, including patrol vehicles, a suburban, office space, and equipment caches, are housed in separate facilities, creating an inefficient emergency response system. There is currently no secure holding facility for prisoners, who are held in staff offices.

The facilities that house the wildland fire program are similarly inadequate. Office space for the wildland fire fighting operation is inadequate, and fire engines must be stored outside, exposed to the elements. Wildland fire personnel are stationed on the North Rim from late March through November. This season is often extended to accomplish fuel reduction projects. These seasonal employees are housed in old trailers or old cabins or are required to live in tents, often in freezing temperatures. During the early spring and late fall months, the ability to accomplish wildland fire projects is limited by the housing that is available. The lack of housing has severely restrained the wildland fire effort on the North Rim and has affected employee retention and the ability of the Park to recruit new employees.

The purpose and need for this project is to alleviate the issues described above by providing functional, safe, and efficient facilities for helibase support, EMS, and wildland fire services and providing adequate housing for wildland fire crews to promote employee morale, retention of employees, and the ability to recruit new employees. This Environmental Assessment (EA) explores alternative designs that would meet the purpose and need of the project. This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, regulations of the Council on Environmental Quality (CEQ; 40 CFR 1508.9), the NPS's Director's Order (DO) 12 (NPS 2001a), and the National Historic Preservation Act (NHPA) of 1969, as amended.

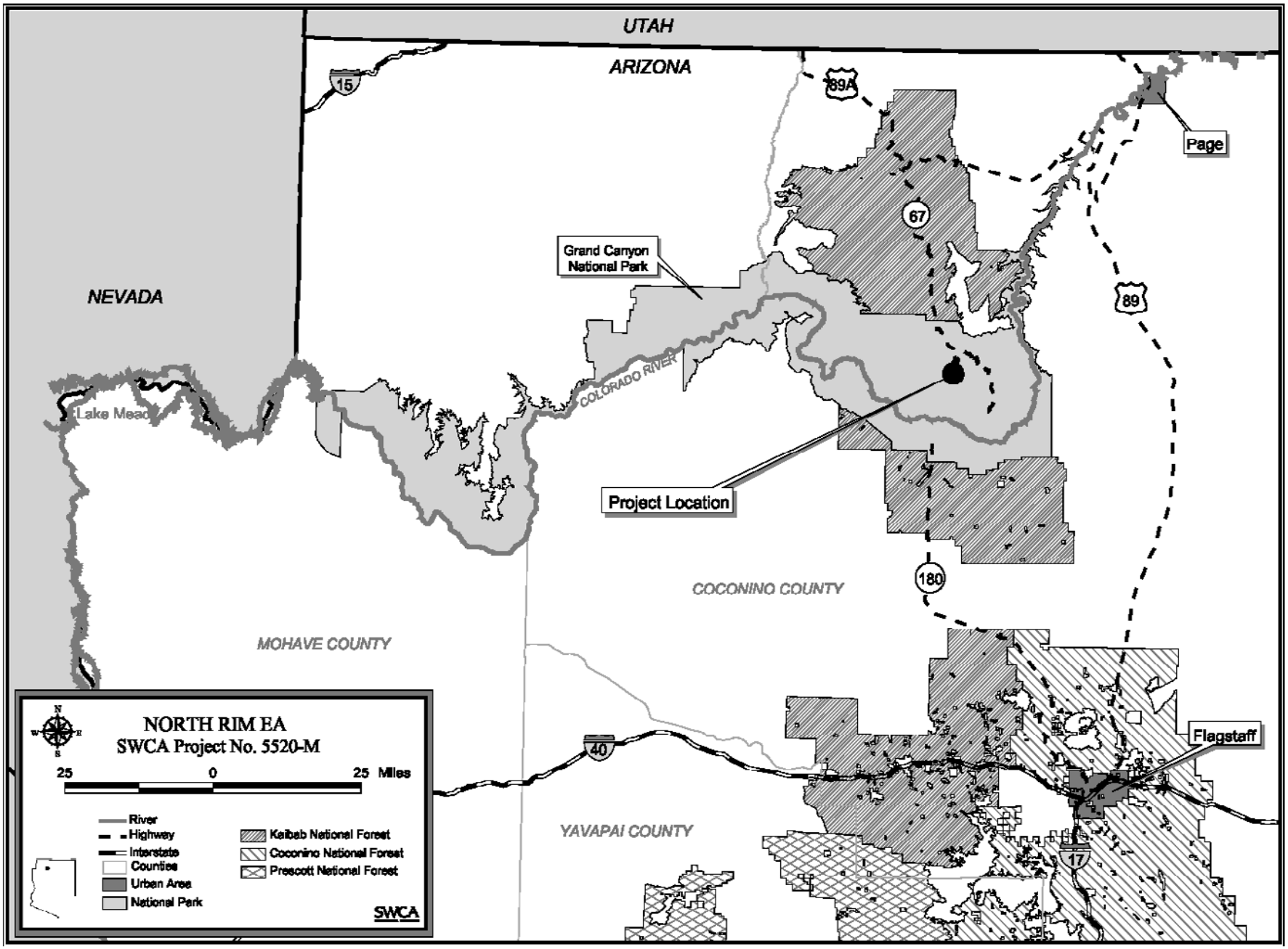


Figure 1. North Rim project location.

PURPOSE AND SIGNIFICANCE OF THE PARK

The purpose of Grand Canyon National Park is based on the legislation establishing the Park (Grand Canyon National Park Establishment Act, 16 U.S.C. 221 et seq.) and the legislation governing the NPS (National Park Service Organic Act, 16 U.S.C. 1-4). As stated in the GMP, the purpose of the Park is

- To preserve and protect its natural and cultural resources and ecological processes, as well as its scenic, aesthetic, and scientific values; and
- To provide opportunities for visitors to experience and understand the environmental interrelationships, resources, and values of the Grand Canyon without impairing the resources.

The values and significance of Grand Canyon National Park, as described in the GMP, include the following:

- World Heritage Site – The Grand Canyon is recognized as a place of universal value, containing superlative natural and cultural features.
- Natural Ecosystem Processes – The Park includes examples of five of the seven life zones and three of the four deserts in North America and serves as an ecological refuge. It is one of the finest examples in the world of arid-land erosion and has a diversity of geologic features and a particularly well-exposed geologic record.
- Natural Resources Research – Six research natural areas within the Park provide opportunities for nondestructive research in areas relatively uninfluenced by humans.
- Cultural Resources – Eight American Indian groups have sacred cultural ties to the Grand Canyon. Over 4,500 years of human occupation have resulted in an extensive archaeological record.
- Scenic Qualities – The Grand Canyon has internationally recognized scenic vistas, a wide variety of scenery, and excellent opportunities for night sky viewing.
- Natural Quiet and Solitude – The Grand Canyon is recognized as a place with direct access to natural quiet and solitude.
- Spiritual/Inspirational Qualities – The vast size and natural, cultural, and scenic qualities of the Grand Canyon give rise to inspirational/spiritual values and a sense of timelessness.
- Recreational Opportunities – The vast majority of the Park provides opportunities for wilderness experiences. The Park contains hundreds of miles of trails and the world's longest stretch of navigable white water.
- Potential Designations – Over 400,000 ha (1,000,000 acres) in the Park meet the criteria for wilderness designation. The Grand Canyon area could become one of the largest, primarily desert wilderness areas in the United States. The Colorado River and most of its tributaries meet the criteria for wild river designation.

SCOPING

A scoping letter (see Appendix A) for several projects, including the construction of a North Rim emergency services building and a wildland fire facility, was sent on 29 November 2000 to the State Historic Preservation Office (SHPO), the U.S. Fish and Wildlife Service (USFWS), the Arizona Game and Fish Department (AGFD), the eight American Indian tribes interested in projects occurring on the North Rim, and 325 interested members of the public and other affected agencies. None of the responses to this scoping letter addressed the emergency services building or the wildland fire facility. A second scoping letter (Appendix A) was issued on 26 July 2002. This letter requested comments on a combined

wildland fire/emergency services facility and preservation treatments of the exposed frame cabins. Responses to this scoping letter were received from the Navajo Nation and the Southwest Utah Five County Association of Governments, neither of which had any concerns with the project. Two members of the public responded requesting to receive a hard copy of the EA.

Public scoping for North Rim projects was a topic of discussion at the monthly GMP community meeting held at the Park on 11 January 2001. A notification and short article on North Rim project proposals was published in the Williams/Grand Canyon newspaper, in the 3-9 January 2001 edition.

NPS staff met with personnel from USFWS and AGFD on 13 December 2000 to discuss this project proposal and other future proposals. NPS staff met with USFWS several times between March and June 2002 to discuss this project proposal in conjunction with a batch consultation for several construction projects, including the preservation treatments of the exposed frame cabins, throughout the Park. Concurrence on the batch consultation was received from USFWS on 9 July 2002 and indicated that the projects may affect but are not likely to adversely affect the Mexican spotted owl and the California condor. Consultation with USFWS regarding the emergency services/wildland fire building is ongoing. SHPO issued a support letter regarding the preservation treatments of the exposed frame cabins on 13 March 2002. The emergency services/wildland fire facility and the exposed frame cabins were discussed at a meeting with SHPO on 16 October 2002.

MANAGEMENT AND PLANNING HISTORY

National Park Service Management Policies (NPS 2001b) is the guiding document for management of all national parks within the national park system. It is the basic Service-wide policy document of the National Park Service and supercedes the 1988 edition. It is the highest of three levels of guidance documents in the NPS Directives System. As stated in the introduction, "It [NPS Directives System] is designed to provide NPS management and staff with clear and continuously updated information on NPS policy and required and/or recommended actions, as well as any other information that will help them manage parks and programs effectively." Among direction on all aspects of park management, these Management Policies set forth direction for each unit of the national park system to maintain an up-to-date General Management Plan.

Grand Canyon National Park is currently operating under the direction of the 1995 General Management Plan (NPS 1995). This plan provides guidance for resource management, visitor use, and general development for a period of 10 to 15 years. The GMP (page 48) called for a new fire/safety building to be constructed in a management support area on the North Rim. The GMP (page 46) also called for adaptive reuse of 4 to 6 of the 26 historic exposed frame cabins. Construction of approximately 270 housing units (page 48) was also proposed. Upon further analysis it was decided that rehabilitating all the exposed frame cabins would serve both to preserve historic buildings at the North Rim and to provide much-needed housing. Because rehabilitating the exposed frame cabins fulfills a need identified in the GMP, this activity is not considered to be outside the scope of the GMP. The GMP is primarily a conceptual plan (page 30), and site-specific planning and design are expected. An Environmental Impact Statement (EIS) for the GMP analyzed the environmental consequences of implementing the actions proposed in the GMP and various alternatives to these actions. This EA incorporates by reference and tiers to the GMP EIS.

Plans for the wildland fire and emergency services facilities originally called for separate buildings for the two functions (see November 2000 scoping letter in Appendix A). The EMS facility would house emergency vehicles and equipment and provide office space, a training room, and a prisoner holding area. The wildland fire facility would provide office space, housing for a fire crew, and space for a fire engine,

fire cache, hazardous materials storage, and a helibase. Interdisciplinary planning meetings in August 1999 and August 2000 identified possible sites for these facilities.

A value analysis for the EMS facility was conducted on 27 and 28 February 2001. A value analysis is a systematic approach of evaluating alternatives in context with the value of identified issues, concerns, and functions. The use of value analysis and the subsequent "choosing by advantages" protocol is mandated by the NPS when evaluating the merits of large projects. The value analysis study sought to evaluate the functionality and cost of three alternative locations for the EMS building (NPS 2001c). The value analysis team evaluated the ability of each alternative to provide a functional facility and safe access to the facility for employees, minimize conflicts between pedestrians and vehicles, prevent loss of resources, and minimize response time to an incident. The value analysis identified the vicinity of the existing water tanks as the preferred location for the EMS facility and also identified the advantages of combining the wildland fire office, engine bay, and cache facility with the EMS facility. Subsequent planning efforts focused on developing a combined emergency services/wildland fire facility and separate housing for the fire crew.

A value analysis study for wildland fire crew quarters was completed in June 2001 (NPS 2001d). The value analysis considered four alternatives for providing crew quarters. The value analysis team recommended rehabilitating the historic exposed frame cabins as the preferred alternative. A rehabilitation study (ARG 2001) of the exposed frame cabins was also completed.

The proposed actions analyzed in this EA and their potential cumulative effects have been discussed at several Grand Canyon National Park Interdisciplinary Team (IDT) meetings. Project specifics were discussed at IDT meetings on 11 March, 16 April, and 12 November 2002, and cumulative impacts were discussed on 20 August, 10 September, and 12 November 2002.

ISSUES AND IMPACT TOPICS

Issues

Issues and concerns affecting this proposal were identified from past NPS planning efforts and input from state and federal agencies. An interdisciplinary team consisting of landscape architects, the value analysis teams, and resource specialists from the NPS also identified issues. The potential issues include the conformance of this proposal to the 1995 GMP and potential impacts to natural resources, scenic values, water quality, floodplains, wetlands, air quality, prime and unique farmland, cultural resources, socioeconomic environment, land use, transportation, environmental justice, recreational values, and park operations. Once issues were identified, they were used to help formulate the alternatives and mitigation measures.

Derivation of Impact Topics

Specific impact topics related to these issues were developed for discussion focus and to allow comparison of the environmental consequences of each alternative. Impact topics were then selected for detailed analysis based on substantive issues; environmental statutes, regulations, and executive orders; and revised NPS Management Policies (NPS 2001b). A summary of the impact topics and rationale for selection or dismissal are given below.

Impact Topics Analyzed in this Document

Soil and Water Resources. NEPA calls for an examination of the impacts on the components of affected ecosystems, and under the authorization of the Clean Water Act of 1972, the Environmental Protection Agency (EPA) administers programs to reduce pollution of surface waters. Because the proposed project would disturb soils and could affect water runoff, this topic will be analyzed in this document.

Biotic Communities. NEPA calls for an examination of the impacts on the components of affected ecosystems. The 2001 NPS Management Policies, the 1995 GMP, and other NPS and Park policies provide general direction for the protection of the abundance and diversity of the Park's naturally occurring communities. Proposed construction would involve the disturbance of vegetation communities. In addition, construction activities have the potential to increase disturbance to adjacent biotic communities. Therefore, this topic will be analyzed in this document.

Exotic Vegetation and Noxious Weeds. Executive Order 13112 mandates all federal agencies to examine the impacts of their activities on the status of invasive species. Proposed ground disturbance could create conditions favorable to exotic vegetation and noxious weeds. In addition, construction equipment could spread existing populations of exotic vegetation and noxious weeds. Therefore, this topic will be analyzed in this document.

Special Status Species (Threatened, Endangered, Candidate, and Rare Species). Section 7 of the 1973 Endangered Species Act (ESA), as amended, requires an examination of impacts to all federally listed threatened or endangered species for any major action authorized, funded, or carried out by a federal agency. NPS policy requires examination of the impacts to state-listed threatened or endangered species and federal candidate species. Representatives from AGFD and USFWS met to discuss this and other Park projects in December 2000. The information provided was used to develop a list of species of concern in the project area (Table 1-1). These species will be analyzed in this document.

Table 1-1. Special Status Species of the North Rim, based on known occurrences or habitat preferences.

Species	Scientific Name	Status	Project Vicinity Occurrence
Mexican spotted owl	*Strix occidentalis lucida*	T, WC	Critical habitat identified at proposed site for EMS/ wildland fire facility. No known occupied habitat within 0.8 km (0.5 mile) of project site
California condor	*Gymnogyps californicus*	T*, WC	Yes
Northern goshawk	*Accipiter gentilis*	WC, SC	Yes
American peregrine falcon	*Falco peregrinus anatum*	WC, SC	Yes
Kaibab squirrel	*Sciurus aberti kaibensis*	NNL	Yes

Key:
T = federally listed as threatened under the Endangered Species Act (ESA); WC = Wildlife species of special concern in Arizona (AZ Game and Fish Department 10/14/96); SC = former species of concern to the US Fish and Wildlife Service, but for which there is no legal status (all former C2 species Fed Reg. 2/28/96); T = federally listed as an experimental non-essential population in Arizona, but in National Parks the species is considered federally listed as threatened under ESA; NNL = population on Kaibab plateau is considered a National Natural Landmark with direction to federal agencies to consider the unique properties of Natural Landmarks when assessing effects of actions on environment.*

Cultural Resources. The 1966 National Historic Preservation Act, as amended, NEPA, the 1916 NPS Organic Act, the 2001 NPS Management Policies, other NPS guidelines, and the Native American Graves Protection and Repatriation Act of 1990 require consideration of impacts on cultural resources. Project undertakings have the potential to affect archaeological resources, sites of special ethnographic significance to American Indians, buildings and structures contributing to the National Register

significance of the North Rim Inn and Campground Historic District and the North Rim Headquarters Historic District, as well as other elements that contribute to the historic cultural landscape at the North Rim. Therefore, this topic will be analyzed in this document.

Viewscapes. Conserving the scenery of national parks and providing for visitor enjoyment are elemental purposes of the NPS according to the 1916 Organic Act. Proposed construction at the North Rim could change the visual appearance of the area. Therefore, this topic will be analyzed in this document.

Visitor Experience. The 1916 NPS Organic Act and the 2001 NPS Management Policies direct national parks to provide for public enjoyment. The North Rim provides a low-key atmosphere where visitors can enjoy the serene environment and sweeping canyon views in a relaxed, uncrowded setting. Visitors would generally not interact with the proposed facilities, but could be affected by construction traffic, increased noise, and disruptions in traffic flow. Therefore, this topic will be analyzed in this document.

Park Operations. Park operations such as maintenance of buildings, roads, and grounds could be affected by the action alternatives. Therefore, this topic will be analyzed in this document.

Impact Topics Dismissed

Geology and Topography. Alteration of geologic processes and features are not proposed in any of the alternatives. No major earthmoving or blasting activities are proposed that would impact geologic processes or features or cause substantial alteration of the topography. In addition, no past, present or foreseeable future actions have affected or would affect geology or topography. Therefore, this topic will not be further addressed in this document.

Prime and Unique Agricultural Land. The CEQ issued a memorandum in August 1980 directing federal agencies to analyze the effects of their actions on soils classified as prime or unique by the Natural Resources Conservation Service. The Farmland Protection Policy Act of 1981, as amended, also requires federal agencies to consider adverse effects to prime and unique farmlands that would result in conversion of these lands to non-agricultural uses. Prime farmland is defined as soil that particularly produces general crops such as common foods, forage, fiber, and oil seed; unique farmland produces specialty crops such as fruits, vegetables and nuts. No prime farmland or unique agricultural lands exist within the Park (Camp 2002); therefore, this topic will not be further addressed in this document.

Air Quality. Grand Canyon National Park is a Class 1 air quality area and receives the highest protection under the Clean Air Act of 1970, as amended. Pollution levels monitored in the Park fall below the levels established by the EPA to protect human health and welfare. However, the ability to see through the air (visibility) is usually well below natural levels because of air pollution. Most of this pollution originates far outside the Park's boundaries, and arrives in the Park as a well-mixed regional haze, rather than as distinct plumes.

Section 118 of the Clean Air Act requires all federal facilities to comply with existing federal, state, and local air pollution control laws and regulations. The scope of this project will not require consultation with the State of Arizona regarding air quality. Project construction at the emergency services/wildland fire facility could result in an increase in fugitive dust from soil exposure and disturbance. However, this effect would occur only during the construction period and would be localized. Water or dust control agents would be applied during construction as necessary to control dust. Project construction would result in increased vehicle emissions from construction equipment and traffic. Tailpipe emissions would be reduced by not idling construction equipment longer than necessary. Increased emissions would be limited to the construction period and would be localized.

Therefore, local air quality may be temporarily degraded by dust generated from construction activities and by emissions from construction equipment. This degradation would result in an overall negligible impact to air quality, and would last only as long as construction activities occurred. Impacts to overall park air quality or regional air quality are not expected. Likewise, impacts from foreseeable future projects in the area would be negligible and would be restricted to the period of construction, and cumulative impacts would be local, short-term, and negligible. Therefore, this topic will not be further addressed in this document.

Floodplains. Executive Order 11988 requires federal agencies to examine potential risk and impacts of placing facilities within floodplains. Facilities at the North Rim are located at a topographic highpoint, and thus there is no opportunity for runoff to accumulate. No floodplains exist at the North Rim. Therefore, this topic will not be further addressed in this document.

Wetlands. Executive Order 11990 requires federal agencies to avoid impacts on wetlands where possible. No jurisdictional wetlands exist at or near the helibase, the exposed frame cabins, or the proposed locations of the emergency services/wildland fire facility. Therefore, this topic will not be further addressed in this document.

Special Status Species (Threatened, Endangered, Candidate, and Rare Species). The USFWS lists the following 16 special status species (in addition to the Mexican spotted owl and California condor, which are addressed under Impact Topics Analyzed in this document) as having the potential to occur in Coconino County.

Brady pincushion cactus (*Pediocactus bradyi*) – endangered
Sentry milk-vetch (*Astragalus cremnophylax* var. *cremnophlylax*) – endangered
Navajo sedge (*Carex specuicola*) – threatened
San Francisco peaks groundsel (*Senecio franciscanus*) – threatened
Siler pincushion cactus (*Pediocactus sileri*) – threatened
Welsh's milkweed (*Asclepias welshii*) – threatened
Arizona bugbane (*Cimicifuga arizonica*) – candidate
Fickeisen plains cactus (*Pediocactus peeblesianus* var, *fickeiseniae*) – candidate
Kanab ambersnail (*Oxyloma haydeni kanabensis*) – endangered
Black-footed ferret (*Mustela nigripes*) – endangered
Humpback chub (*Gila cypha*) – endangered
Razorback sucker (*Xyrauchen texanus*) – endangered
Southwestern willow flycatcher (*Empidonax traillii extimus*) – endangered
Little Colorado spinedace (*Lepidomeda vittata*) – threatened
Bald eagle (*Haliaeetus leucocephalus*) – threatened
Chiricahua leopard frog (*Rana chiricahuensis*) – threatened

In addition to the federally listed species, the NPS must consider state-listed special status species. The following species, in addition to those listed in Table 1-1, have the potential to be affected by projects on the North Rim.

Mogollon columbine (*Aquilegia desertorum*) – salvage restricted.
Western fairy slipper (*Calypso bulbosa*) – salvage restricted.

Grand Canyon National Park botanists and wildlife biologists reviewed the project area and determined that habitat for the above federal and state-listed species does not exist at the North Rim. This

determination is based on site-specific knowledge of the area, reconnaissance of the area, knowledge of the species and habitats in question, and professional judgment.

Two additional species, the greater western mastiff bat (*Eumops perotis californicus*) and spotted bat (*Euderma maculatum)*, are known to occur in the project vicinity but would not be affected by the project. Both species roost in cliffs and are insectivorous. Greater western mastiff bats forage above the canopy and spotted bats forage in meadows. The proposed project and past, present, or foreseeable future actions would not affect roosting or foraging habitat or prey populations for these species. Therefore, this topic will not be further addressed in this document.

Socioeconomic Environment. The socioeconomic environment consists of local and regional businesses and residents, the local and regional economy, and park concessions. The local economy and most businesses in the surrounding communities are based on professional services, construction, tourist sales and services, and educational research. The regional economy is strongly influenced by tourist activity. The GMP EIS discussed the socioeconomic environment and impacts extensively. There may be short-term benefits to the local and regional economy resulting from construction-related expenditures and employment. Local and regional businesses would be negligibly affected in the long-term. The short- and long-term socioeconomic impacts of implementing the action alternatives and of past, present, and reasonably foreseeable future actions would be consistent with the impacts described in the GMP EIS. Therefore, this topic will not be further addressed in this document.

Environmental Justice. Executive Order 12898 requires federal agencies to identify and address disproportionately high and adverse human health or environmental effects on minority and low-income populations. None of the proposed alternatives or any past, present, or reasonably foreseeable future actions would have a disproportionately high and adverse effect on any minority or low-income population or community. Therefore, this topic will not be further addressed in this document.

Soundscape. The NPS is mandated by Director's Order 47 to articulate the National Park Service's operational policies that would require, to the fullest extent practicable, the protection, maintenance, or restoration of the natural soundscape resource in a condition unimpaired by inappropriate or excessive noise sources. Natural sounds are intrinsic elements of the environment that are often associated with parks and park purposes. They are inherent components of "the scenery and the natural and historic objects and the wild life" protected by the NPS Organic Act. They are vital to the natural functioning of many parks and may provide valuable indicators of the health of various ecosystems. Intrusive sounds are of concern to the NPS because they sometimes impede the NPS's ability to accomplish its mission.

Noise impacts from this project would last only the duration of the construction. After construction is completed, noise levels would return to their pre-construction condition. Construction would occur during daylight hours when roads and the associated traffic already impact the developed area of the North Rim. Any additional traffic would be temporary and would not affect or would negligibly affect the areas in the short term. Therefore, this project would have no measurable effects on the soundscape. Similarly, the effects of past, present, and foreseeable future actions on the soundscape would be short-term and would not measurably affect the soundscape. The potential effects of noise on visitor experience and special status species are addressed under those impact topics. Therefore, this topic will not be analyzed in this document.

CHAPTER 2 - ALTERNATIVES

INTRODUCTION

The NPS has adopted the concept of sustainable design as a guiding principle of facility planning and development. The objectives of sustainability are to design park facilities to minimize adverse effects on natural and cultural values, to reflect their environmental setting, and to maintain and encourage biodiversity; to construct and retrofit facilities using energy-efficient materials and building techniques; to operate and maintain facilities to promote their sustainability; and to illustrate and promote conservation principles and practices through sustainable design and ecologically sensitive use. Essentially, sustainability is living within the environment with the least impact on the environment. The action alternatives subscribe to and support the practice of sustainable planning, design, and human use of the North Rim developed area with its associated public and administrative facilities.

This document analyzes the No-Action Alternative and three action alternatives. Analysis of the No-Action Alternative is required under NEPA (40 CFR 1502.14(d)). It provides a baseline for assessing the potential impacts of the preferred alternative and the other action alternatives. In developing alternatives for this project some actions were considered and subsequently dismissed. A description of alternatives considered but dismissed from detailed study is included in this chapter. A summary table comparing alternative components is also presented at the end of this chapter.

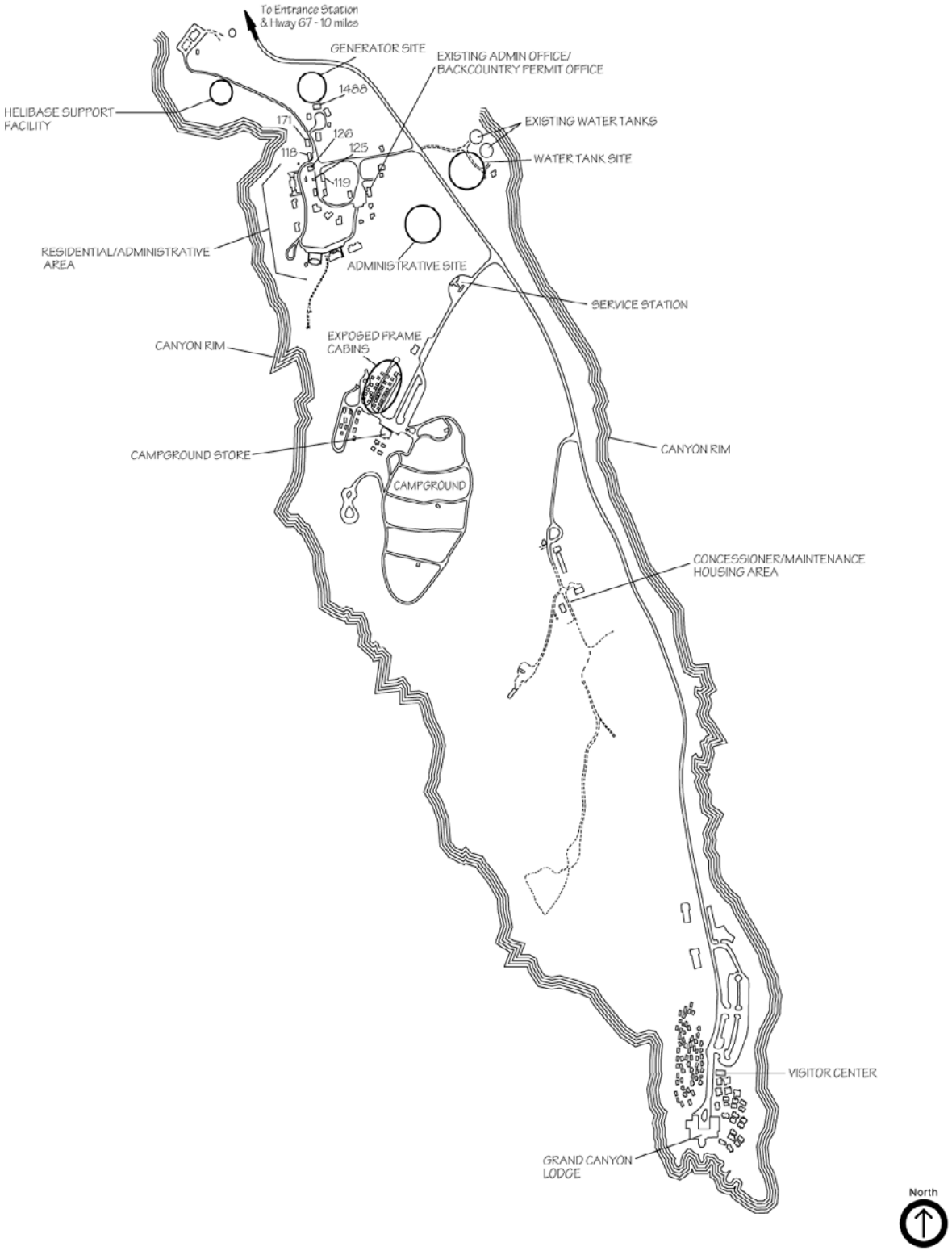
The action alternatives are based on preliminary designs and best information available at the time of this writing. Specific distances, areas, and layouts used to describe the alternatives are only estimates and could change during final site design. If changes during final site design were not consistent with the intent and effects of the selected alternative, then additional compliance would be completed as appropriate.

This document also analyzes cumulative impacts that would result from a given alternative in addition to all past, present, and reasonably foreseeable future actions. These past, present, and reasonably foreseeable future actions would occur regardless of which alternative is selected. Past, present, and reasonably foreseeable future actions are described in Appendix B and in Chapter 3 under Cumulative Impacts and under each impact topic.

ALTERNATIVE A – NO ACTION

The No-Action Alternative would maintain the existing conditions at the North Rim (Figure 2) and provides the baseline for comparison with the action alternatives. Past and present activities that have affected the Bright Angel Peninsula and the surrounding area include the Outlet Fire, prescribed fire, and existing development and visitation at the North Rim. Existing developments (roads, trails, parking areas, buildings, and utilities) have affected approximately 95 ha (234 acres) within the Bright Angel Peninsula sub-unit of the Bright Angel watershed. The North Rim receives most of its visitation between May and October, when facilities at the North Rim are open. Visitation peaks in the summer months of June and July and is very limited in winter when snow blocks the road. Park staff are present at the North Rim throughout the year and perform general maintenance functions. The Outlet Fire burned approximately 5,666 ha (14,000 acres) on the North Rim in May 2000. Approximately 1,526 ha (3,772 acres) of the burn occurred in the Bright Angel Peninsula sub-unit. The fire burned in a mosaic pattern, with areas of low, moderate, and high burn severities throughout the fire perimeter. Prescribed burning has been conducted on 892 ha (2,203 acres) within the watershed sub-unit since 1997.

Figure 2. Existing facilities at Bright Angel Peninsula and proposed sites of emergency services/ wildland fire facility, helibase support facility, and preservation treatments of exposed frame cabins.



Under the No-Action Alternative, no new facilities for helibase support, emergency services, or wildland fire would be constructed. Office space and storage facilities for the helibase would continue to be housed in inadequate facilities. Emergency services operations would remain housed in several locations, including buildings 118 (fire management office), 119 (patrol office and ranger office), 125 (holding facility/gas station), 126 (fire house), and 171 (fire cache). The ambulance and fire engine would remain in a facility (building 126) that violates NFPA standards. Prisoners would continue to be held in staff offices. Wildland fire crews would continue to be housed in old cabins or old trailers or would be required to live in tents. Fire engines for the wildland fire crew would continue to be stored outdoors.

ITEMS APPLICABLE TO ALL ACTION ALTERNATIVES

Helibase Support Facility. The old entrance station kiosk and associated storage building would be removed and replaced with a single 18.6-square-m (200-square-foot) building adjacent to the helipad (Figure 2). The new building would accommodate office space and equipment storage. A device to prevent condors from landing on the building would be placed on the roof to discourage condors from visiting the site. The site for the new helibase support facility has been previously disturbed and no vegetation would be removed during construction.

Emergency Services/Wildland Fire Facility. Under all the action alternatives, a new emergency services/wildland fire facility would be built. The facility would occupy approximately 984 square m (10,590 square feet) and would have EMS facilities grouped at one end of the building, wildland fire facilities at the other, and shared spaces inbetween. EMS facilities would include storage areas for emergency services vehicles (fire engine, ambulance, patrol cars, and suburban), caches for EMS and search and rescue equipment, men's and women's locker rooms, holding cells, and office space. The wildland fire facilities would include storage areas for vehicles, a fire equipment cache, and office, laboratory, and work spaces. Shared facilities would include offices, a conference room, and maintenance facilities.

Parking at the facility for staff and visitors would accommodate approximately 15 vehicles. Paved areas for parking and roads would occupy approximately 0.4 ha (0.9 acre). The total area of ground disturbed at the site would be approximately 0.8 ha (2.0 acres), and approximately 0.25 ha (0.6 acre) would be revegetated following construction. All utilities would be connected to the facility underground. The utility trench would be 1 meter (3 feet) wide, and the utility corridor would be 3 m (10 feet) wide to accommodate equipment and sidecast materials.

The existing facilities being used for wildland fire and EMS functions (see Alternative A – No Action above) would be vacated. The future uses of the buildings have not been determined but are part of on-going Park planning.

Exposed Frame Cabins. The exposed frame cabins are located in the North Rim Inn and Campground Historic District, near the North Rim campground (Figure 2). These buildings were constructed around 1929 and were remodeled in the 1930s and 1960s. There are 26 one-room cabins, a shower facility, and a laundry facility. These buildings were last used in 1989 and have not been maintained since then. All 28 buildings would be restored (cabins 2, 17, 19, 20, and 25), rehabilitated (cabins 3, 4, 5, 6, 11, 12, 13, 15, 18, 21, 22, 23, 24, 26, and 27 and laundry and shower facilities), or reconstructed (cabins 1, 7, 8, 10, 14, and 16). The extent of efforts necessary to make the buildings functional would vary, depending on the existing condition of each cabin. Restoration would entail maintaining the original historic fabric of the cabins and restoring them to their original condition by replacing damaged elements with materials scavenged from cabins designated for reconstruction. Damaged elements may also be repaired rather than replaced. Cabins that are rehabilitated would be preserved and upgraded to year-round habitability.

Historic material would be maintained wherever possible, but in-kind replacements would be permissible. Cabins that are scheduled for reconstruction would be preserved by disassembly and reconstruction using as much of the original material as possible. On completion, these cabins would match the appearance of the original structures. All work would be conducted in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties and in consultation with SHPO. Exterior modifications would consist of items such as repairing and/or replacing roofs, siding, flooring, windows, and doors. Interior modifications would consist of installing kitchenette units, repairing or replacing bathroom fixtures, and installing indoor water heaters.

Staging Area. Minor staging would occur within the construction limits at the site of the emergency services/wildland fire facility, in areas designated for parking lots. The primary staging area would be at Lindbergh Hill, approximately 8 km (5 miles) north of the North Rim developed area along Highway 67. Lindbergh Hill is a large, disturbed area that is used for fire camps. It has electrical utilities on site, and no removal of vegetation would be required. Following construction, the site would be returned to pre-construction conditions.

ALTERNATIVE B – WATER TANK SITE (PREFERRED ALTERNATIVE)

Under the Preferred Alternative, the new emergency services/wildland fire facility would be built adjacent to the existing water storage tanks (Figures 2 and 3). The project site is bounded by Arizona Highway 67 to the west and by the water tanks to the east. Approximately half the site has been disturbed by existing utilities and access roads. Site designs include rehabilitation of an existing dirt road to create a paved north access road and construction of parking areas, a service road, and a paved south access road. The facility would be set back approximately 34 m (110 ft) from Highway 67. Dense vegetation between the road and the facility would be retained to screen the building and the existing water tanks from the road, and additional vegetation salvaged from the construction site would be transplanted as screening. Water service at the site consists of underground water lines at the southern edge of the site. The nearest power and sewer utilities are 183 m (600 feet) to the west in the NPS administrative area. Trenching for these utilities would result in disturbance to approximately 0.06 ha (0.14 acre).

ALTERNATIVE C – GENERATOR SITE

Under Alternative C, the emergency services/wildland fire facility would be built at the north end of the administrative area, immediately north of the generator building (No. 1488) (Figures 2 and 4). The site is within 61 m (200 feet) of water, sewer, and electrical utilities. Trenching for these utilities would disturb approximately 0.02 ha (0.05 acre). Site designs include a single paved access road to Highway 67 and a second paved access road connecting to the existing access road to the water treatment plant. The building would be approximately 46 m (150 feet) from the highway and would be in a direct line of sight to southbound traffic entering the North Rim developed area on Highway 67. The facility would be partially screened by existing vegetation for northbound traffic. Vegetation would be planted to provide additional screening. Approximately half the site has been disturbed by previous developments. A portion of the facility site would be within the North Rim Headquarters Historic District.

Figure 3. Location of emergency services/wildland fire facility under Alternative B.

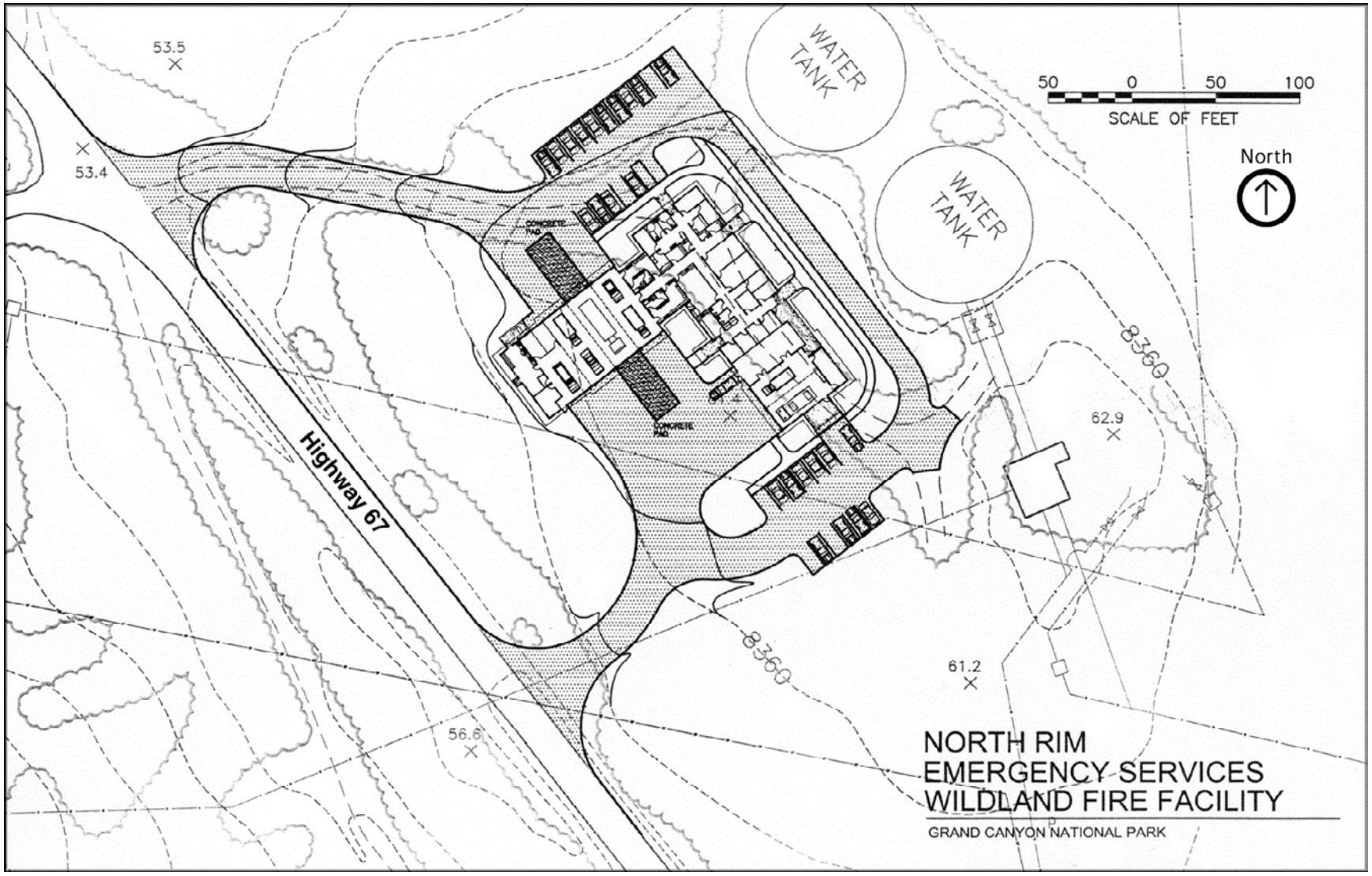
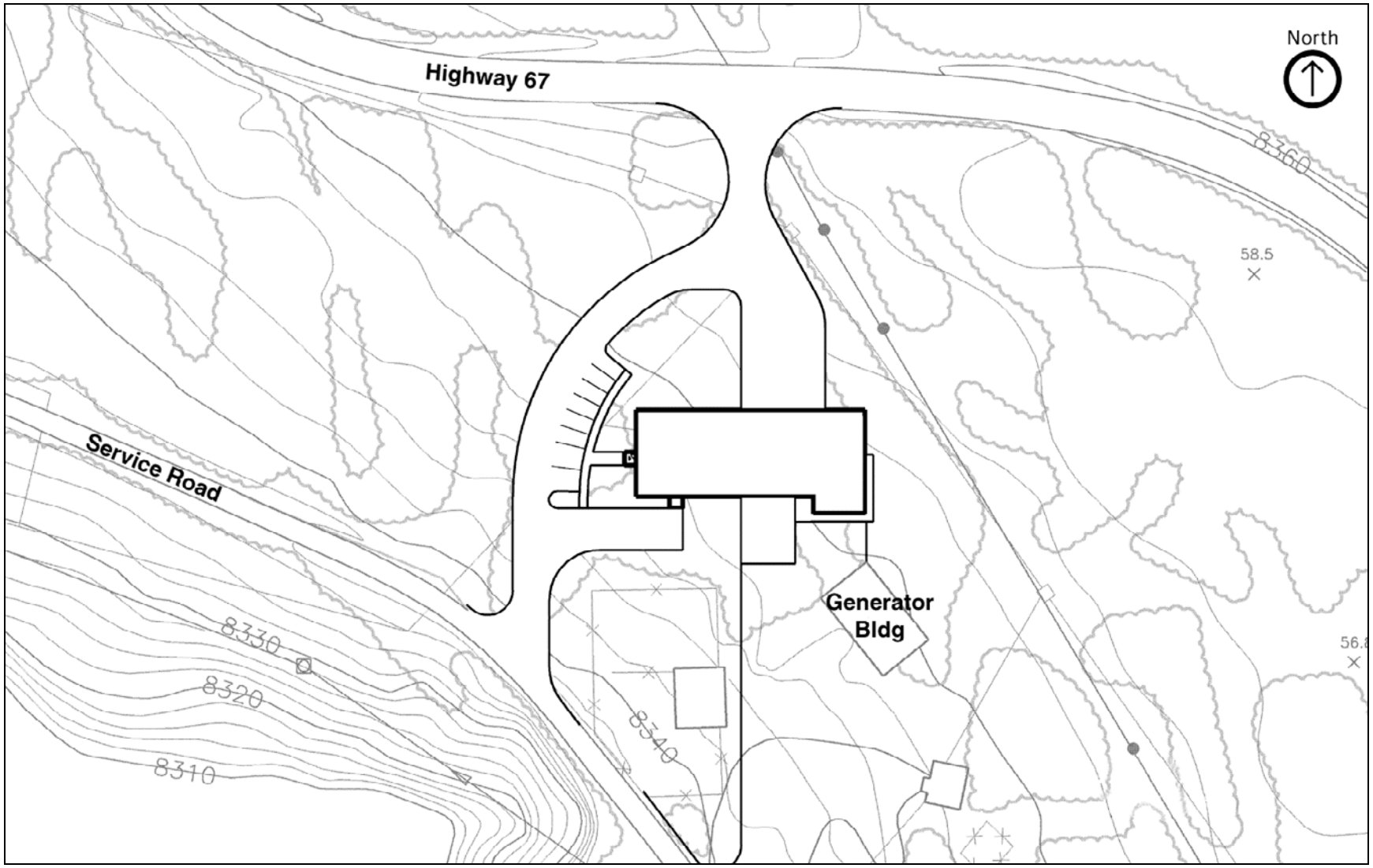


Figure 4. Location of emergency services/wildland fire facility under Alternative C.



ALTERNATIVE D – ADMINISTRATIVE SITE

Under Alternative D, the emergency services/wildland fire facility would be built approximately 46 m (150 feet) to the west of Highway 67, between the road and the administrative area (Figures 2 and 5). Site designs include construction of paved access roads to the north and south and paved parking areas. The site is 30 m (100 feet) from water service, 91 m (300 feet) from sewer lines, and 61 m (200 feet) from electrical utilities. Trenching for these utilities would disturb approximately 0.06 ha (0.14 acre). The site is adjacent to and within sight of the North Rim Headquarters Historic District, and little vegetation exists between the site and the highway that would screen the facility. Vegetation would be planted to provide screening from the road. The site is undisturbed except for existing utility corridors.

ALTERNATIVES ELIMINATED FROM DETAILED STUDY

Several different designs for the emergency services/wildland fire facility were considered. These designs included separate buildings for the EMS and wildland fire functions and various layouts for a single building. These designs were eliminated because of design inefficiencies or excessive square footage required.

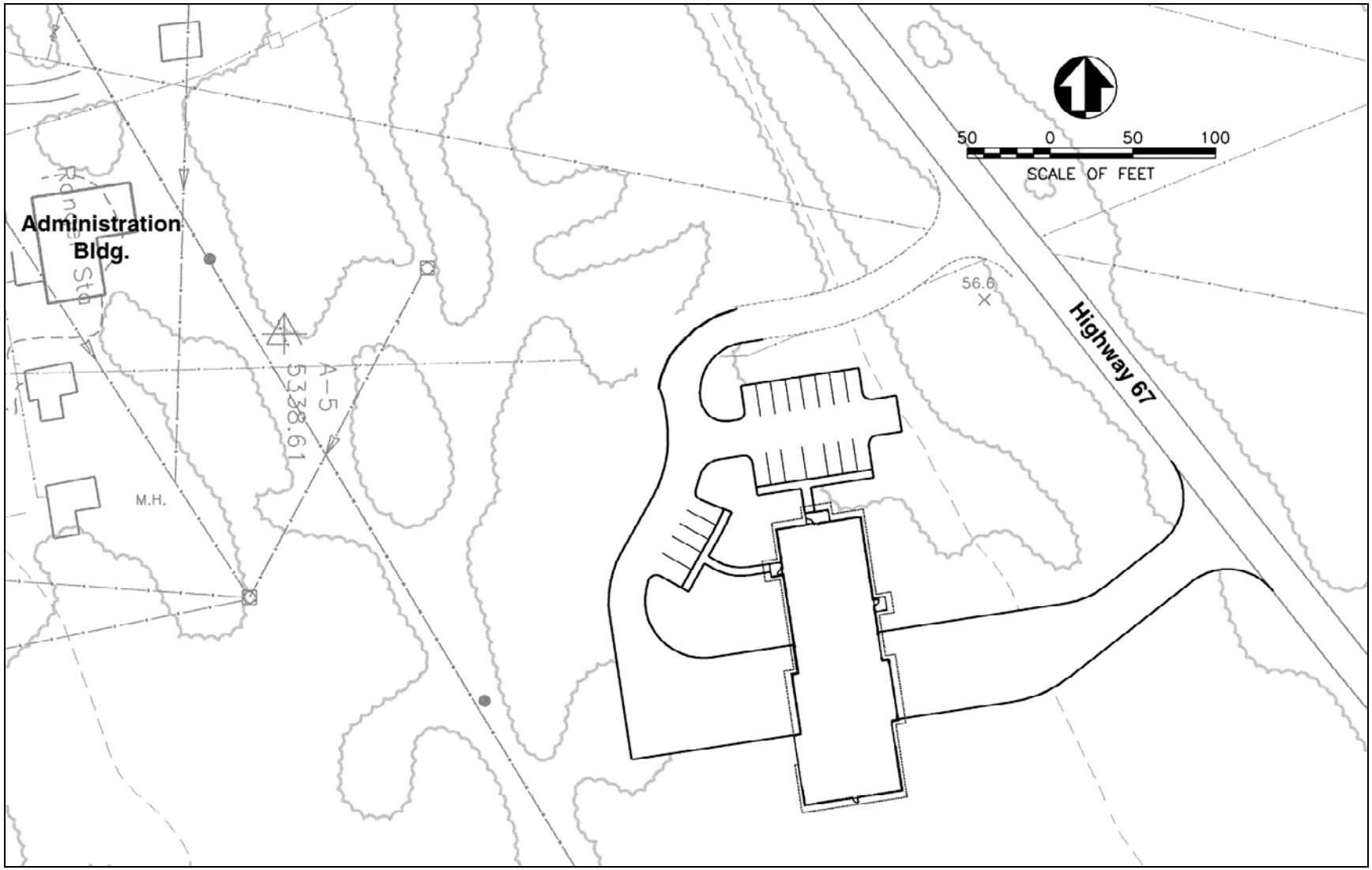
Three alternatives in addition to rehabilitating the exposed frame cabins were considered for housing the wildland fire crew. All three alternatives consisted of constructing new housing at various locations. These alternatives were dismissed during the value analysis study for the North Rim wildland fire crew quarters (NPS 2001d) because new construction would involve more site disturbance and increased maintenance efforts and because rehabilitating historic structures would demonstrate the Park's commitment to historical preservation.

A Cultural Landscape Report (CLR) is currently being prepared for the North Rim Bright Angel Peninsula Developed Area (OCULUS 2002). The purposes of the CLR are to identify, document, analyze, and evaluate contributing and non-contributing cultural landscape characteristics within the cultural landscape and to provide specific recommendations and comprehensive vision for the landscape to guide long-term management. Once completed, the CLR will serve as a supporting document for implementation of the GMP. The draft CLR provides specific recommendations for the location of the emergency services/wildland fire facility identified under the preferred alternative (Alternative B). The CLR states that the site proposed under Alternative B is not a major contributor to the significance of the study area and that the site is preferable to other locations because it is disturbed (OCULUS 2002:V-24). However, the CLR recommends that the site be developed as unobtrusively as possible and as much existing vegetation as possible be retained between the new facility and the entrance road (OCULUS 2002:V-24). The CLR also offers a recommendation to realign the angle of the proposed entrance roads (Figure 3) so that the facility is not as easily seen by visitors traveling on the entrance road:

> "It is recommended that, if feasible, the alignment of the road be modified and part of the old bed revegetated to block the view of the facility. Likewise, if the design of the new east entrance drive to the facility could be slightly realigned to block potential views into the garage and vehicle parking area from the Entrance Road corridor."

This recommendation was considered but ultimately dismissed. The proposed entrance drives are existing dirt roads and/or open areas void of trees. Using these alignments minimizes the amount of new ground disturbance and tree removal that would be required for the entrance roads. The existing road alignments are also at an angle conducive to the maneuverability of large fire trucks. While the

Figure 5. Location of emergency services/wildland fire facility under Alternative D.



alignment of the roads could be shifted and made to be more perpendicular to Highway 67, this would require tree removal and ground disturbance in an area that has a relatively high density of trees. This alignment change would not adequately accommodate large fire trucks coming into and out of the facility. Changing the alignment of the entrance drives to minimize the visibility of the building from the Entrance Road would require planting trees and other vegetation in the existing proposed alignment along the dirt road on the northwest end and the open corridor on the southeast end. Revegetation can be successful and is used for many projects within the park to maximize native ground cover in disturbed areas. Revegetation for use as screening can also be successful, but would require a long period of time for small trees to grow to appropriate heights and for vegetation to be dense enough to hide a large structure such as the proposed facility. For these reasons, the recommendation made in the draft CLR to realign the roads into the proposed facility was dismissed. Other recommendations, such as retaining as much vegetation as possible between the building and Highway 67, using muted exterior colors for the building, and avoiding use of shiny metal surfaces would be implemented and are expected to minimize the potential for adverse impacts to the cultural landscape.

ENVIRONMENTALLY PREFERRED ALTERNATIVE

NPS policy requires identification of an environmentally preferred alternative. The environmentally preferred alternative is determined by applying the criteria suggested in NEPA, which is guided by the CEQ. The CEQ provides direction that "[t]he environmentally preferred alternative is the alternative that would promote the national environmental policy as expressed in NEPA's Section 101:"

1. Fulfill the responsibilities of each generation as trustee of the environment for succeeding generations;
2. Assure for all generations safe, healthful, productive, and esthetically and culturally pleasing surroundings;
3. Attain the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences;
4. Preserve important historic, cultural, and natural aspects of our national heritage and maintain, wherever possible, an environment that supports diversity and variety of individual choice;
5. Achieve a balance between population and resource use that will permit high standard of living and a wide sharing of life's amenities; and
6. Enhance the quality of renewable resources and approach the maximum attainable recycling of depleted resources.

Alternative A (No Action) would not address inadequacies in the current emergency response system at the North Rim and would not contribute to the preservation of existing historic structures. Therefore, Alternative A would not fulfill criteria 2 and 4.

Alternative B would fulfill criterion 2 by addressing current inadequacies in the emergency response system and providing a design for the Emergency Services/Wildland Fire facility that would not result in traffic hazards on the entrance road or conflicts between visitor and emergency traffic. Alternative B would also fulfill criterion 4 by applying preservation treatments to existing historic structures and avoiding any adverse impacts to historic districts.

Alternative C would address inadequacies in the current emergency response system but would create a traffic hazard on the entrance road. Therefore, Alternative C would only partially fulfill criterion 2. Although Alternative C would apply preservation treatments to existing historic structures, it would also have an adverse impact on the North Rim Headquarters Historic District and thus would only partially fulfill criterion 4.

Alternative D would address inadequacies in the current emergency response system but could create confusion for visitors trying to reach the backcountry office. Therefore, Alternative C would only partially fulfill criterion 2. Although Alternative D would apply preservation treatments to existing historic structures, it would also have an adverse impact on the North Rim Headquarters Historic District and thus would only partially fulfill criterion 4.

Alternative B would avoid adverse impacts to historic properties, provide for preservation treatments of historic structures, and provide for improved emergency services and wildland fire facilities without creating long-term hazards or confusion for visitors. Alternatives A, C, and D would be lacking in one or more of these areas. Because Alternative B would fulfill the criteria above more completely than the other alternatives, it is the environmentally preferred alternative.

MITIGATION MEASURES

To minimize resource impacts, the integral design features (i.e., mitigation measures) below would be followed for all action alternatives and are analyzed as part of the action alternatives. These actions were developed to lessen the adverse effects of the proposed action, and have proven to be very effective in reducing environmental impacts on previous projects.

Contractor Orientation. Contractors working in the Park are given an orientation concerning proper conduct of operations. This orientation is provided in both written form and verbally at a pre-construction meeting. This policy will continue on proposed projects. Orientation topics will include:

- Wildlife should not be approached or fed.
- Collecting any Park resources, including plants, animals, and historic or prehistoric materials, is prohibited.
- Contractor must have a safety policy in place and follow it.
- Other environmental concerns and requirements discussed elsewhere in this EA will be addressed, including relevant mitigation measures listed below.

Limitation of Area Affected. The following mitigation measures will be implemented to minimize the area affected by construction activities.

- The staging area for the construction office (a trailer), construction equipment, and material storage will be located in previously disturbed areas near the project site. All staging areas will be returned to pre-construction conditions once construction is complete. Standards for this, and methods for determining when the standards are met, will be developed in consultation with the Park Restoration Biologist.
- Construction zones will be fenced with construction tape, snow fencing, or some similar material before any construction activity. The fencing will define the construction zone and confine activity to the minimum area required for construction. All protection measures will be clearly stated in the construction specifications, and workers will be instructed to avoid conducting activities beyond the construction zone as defined by the construction zone fencing.

Soil Erosion. To minimize soil erosion, the following mitigation measures will be incorporated into the action alternatives.

- Standard erosion control measures such as silt fences, sand bags, or equivalent control methods will be used to minimize any potential soil erosion.
- Any trenching operations will be by rock saw, backhoe, trackhoe, and/or trencher, with excavated material side-cast for storage. After trenching is complete, bedding material will be placed and compacted in the bottom of the trench and the utility lines installed in the bedding material. Back filling and compaction will begin immediately after the utility lines are placed into the trench, and the trench surface will be returned to pre-construction contours. All trenching restoration operations will follow guidelines approved by Park staff. Compacted soils will be scarified and original contours reestablished.
- A Salvage and Revegetation Plan will be developed for the project by a landscape architect or other qualified individual, in coordination with the Park Restoration Biologist. Any revegetation efforts will use site-adapted native species and/or native seed, and Park policies regarding revegetation and site restoration will be incorporated into the plan. The plan will consider, among other things, the use of native species, plant salvage potential, exotic vegetation and noxious weeds, and pedestrian barriers. Policy related to revegetation is referenced in NPS Management Policies (NPS 2001b; Chapter 9).

Water Quality. To minimize potential impacts to water quality, the following mitigation measures will be incorporated into the action alternatives.

- A storm water pollution prevention plan (SWPPP) will be developed by the contractor and approved by the Park prior to any ground-disturbing activities. All National Pollutant Discharge Elimination System (NPDES) requirements will be met.
- Standard erosion control measures such as silt fences, sand bags, or equivalent control methods will be used to minimize any potential sediment delivery to streams.

Exotic Vegetation and Noxious Weeds. To prevent the introduction and minimize the spread of exotic vegetation and noxious weeds, the following mitigation measures will be incorporated into the action alternatives.

- Existing populations of exotic vegetation at the construction site will be treated prior to construction activities.
- All construction equipment that would leave the road (e.g., bulldozers and backhoes) will be pressure washed prior to entering the Park.
- The location of the staging area for construction equipment will be Park-approved and treated for exotic vegetation.
- Parking of vehicles will be limited to existing roads or the staging area.
- Any fill, rock, or additional topsoil needed will be obtained from a Park-approved source.
- All areas disturbed by construction will be revegetated using site-adapted native seed and/or plants.

Special Status Species. To protect any unknown or undiscovered threatened, endangered, or special status species, the construction contract will include provisions for the discovery of such. These provisions will require the cessation of construction activities until Park staff evaluate the project impact on the discovery and will allow modification of the contract for any protection measures determined necessary to protect the discovery. Mitigation measures for known special status species are as follows:

California Condor

- Prior to the start of a construction project, the Park will contact personnel monitoring California condor locations and movement within the Park to determine the locations and status of condors in or near the project area.
- If a condor occurs at the construction site, construction will cease until it leaves on its own or until permitted personnel employ techniques that result in the individual condor leaving the area.
- Construction workers and supervisors will be instructed to avoid interaction with condors and to contact the appropriate Park or Peregrine Fund personnel immediately if and when condor(s) occur at a construction site.
- The construction site will be cleaned up at the end of each day that work is being conducted (i.e., trash disposed of, scrap materials picked up) to minimize the likelihood of condors visiting the site. Park condor staff will complete a site visit to the area to ensure adequate clean-up measures are taken.
- To prevent water contamination and potential poisoning of condors, a vehicle fluid-leakage and spill plan will be developed and implemented for this project. This plan will be reviewed by the Park biologist for adequacy in addressing condors.
- If a new structure occurs on the rim or above tree line in other areas, there may be a need to install condor deterrent devices on the structure. This will be evaluated on a case-by-case basis by the Park wildlife biologist.
- If non-nesting condors occur within 1 mile of the project area, blasting will be postponed until condors leave or are hazed by permitted personnel.
- If condor nesting activity is known within 1 mile of the project area, then blasting activity will be restricted during the active nesting season. The active nesting season is February 1 to September 30. These dates may be modified based on the most current information, in consultation with the Park biologist and the USFWS.
- If condor nesting activity is known within 0.5 mile of the project area, then light and heavy construction in the project area will be restricted during the active nesting season. The active nesting season is February 1 to September 30. These dates may be modified based on the most current information, in consultation with the Park biologist and the USFWS.

Mexican Spotted Owl (MSO)

- If a construction project occurs within a Protected Activity Center (PAC) with no known nest site, all construction activity will be restricted to the non-breeding season (September 1 – February 28). However, if the project in a PAC is at least 0.8 km (0.5 mile) from known nest sites and the project does not include blasting, the project can be implemented during the breeding season. The breeding season is March 1 – August 31.
- If a construction project outside of PACs occurs within 1.6 km (1 mile) of a known PAC nest or roost site, the boundary of a PAC where the nest or roost site is not known, or unsurveyed restricted, protected, or predicted MSO habitat, then all blasting in that project area will be restricted to the non-breeding season (September 1 – February 28).
- If a construction project outside of PACs occurs within 0.8 km (0.5 mile) of a known PAC nest or roost site, the boundary of a PAC where the nest or roost site is not known, or unsurveyed restricted, protected, or predicted MSO habitat, then light and heavy construction activity in that project area will be restricted to the non-breeding season (September 1 – February 28).

Cultural Resources. To minimize the impacts of construction activities on cultural resources, the following mitigation measures will be incorporated into the action alternatives.

- If presently unidentified archeological resources are discovered during the course of the project, work in that location will stop until the resources are properly recorded by an NPS archeologist and evaluated under the eligibility criteria of the National Register of Historic Places. If (in consultation with the Arizona State Historic Preservation Office) the resources are determined eligible, appropriate measures will be implemented either to avoid further resource impacts or to mitigate their loss or disturbance. In compliance with the Native American Graves Protection and Repatriation Act of 1990, the NPS will also notify and consult concerned tribal representatives for the proper treatment of human remains or funerary and sacred objects should these be discovered during the course of the project.
- All undertakings affecting historic buildings and structures will be carried out in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* (60 FR 35842-35844) and other applicable NPS cultural resources policies and guidelines.

Viewscapes. To minimize visual impacts, mitigation measures will include the following:

- Clearing of forested areas will be limited to the immediate construction zone associated with trenching and other construction. Construction tape or snow fencing will surround the established construction zone to minimize damage to vegetation and other features by construction equipment and to define access to the construction site.
- Alignment of utility corridors will be located where possible through existing open clearings in forested areas. Trench locations will be placed perpendicular to roadways to create as short a duration of viewing time for visitors to the disturbed area as possible.
- Trenching for underground utilities will be limited as much as possible to a 10-foot wide fenced construction zone. Clearing of trees and understory will be feathered to blend with natural openings in the forest canopy.
- Natural, muted colors will be used to blend any metal surfaces into the landscape.
- All contractors will use Lindbergh Hill for primary staging to minimize ground disturbance and to decrease the amount of construction equipment visible to visitors.

Visitor Experience. The following mitigation measures will be incorporated into the action alternatives to minimize the impacts of construction activities on the visitor experience:

- Unless otherwise approved by the Park, construction activities will not occur on Saturdays, Sundays, or holidays to minimize disruption to visitors during peak days.
- Traffic in any one direction will not be stopped for more than 15 minutes to minimize disruption to traffic flow.
- Unless otherwise approved by the Park, construction activities will be restricted to 8:00 am to 6:00 pm in the summer (May 1- September 30) and to 9:00 am to 5:00 pm during the rest of the year.
- Information regarding implementation of this project and other foreseeable future projects would be shared with the public upon their entry into the Park during construction periods. This may take the form of an informational brochure or flyer distributed at the gate and sent to those with reservations at park facilities, postings on the Park's website, press releases, and/or other methods.

Park Operations. The following mitigation measures will be incorporated into the action alternatives to minimize the impacts of construction activities on park operations:

- An independent contract inspector will be hired so Park staff will not be responsible for monitoring day-to-day contract compliance.

Air Quality. Air quality impacts of the action alternatives are expected to be temporary and localized. To minimize these impacts, the following actions will be taken:

- To reduce entrainment of fine particles from hauling material, sufficient freeboard will be maintained and loose material loads (aggregate, soils, etc.) will be tarped.
- To reduce tailpipe emissions, construction equipment will not be left idling any longer than is necessary for safety and mechanical reasons.
- To reduce construction dust in the short-term, water will be applied to problem areas. Equipment will be limited to the fenced project area to minimize soil disturbance and consequent dust generation.
- Landscaping and revegetation will control long-term soil dust production. Mulch and the plants themselves will stabilize the soil and reduce wind speed/shear against the ground surface.

ALTERNATIVES AND PROJECT OBJECTIVES

The objectives of the action are to meet the purpose and need of the project as described in Chapter 1 (to provide functional, safe, and efficient facilities for EMS and wildland fire services and to provide adequate housing for wildland fire crews to promote employee morale, retention of employees, and the ability to recruit new employees) while minimizing any adverse impacts to cultural and natural resources. The preferred alternative clearly addresses each of these objectives. Table 2-1 displays alternative components and compares the ability of the alternatives to meet the project objectives. Table 2-2 is a comparative summary of the environmental impacts among the no-action and action alternatives.

Table 2-1. Summary of Alternative Components.

Component	No Action	Preferred Alternative	Generator Site	Administrative Site
Helibase Support Facility	Existing facilities would continue to be used.	A new facility would be constructed in place of the existing facilities.	A new facility would be constructed in place of the existing facilities.	A new facility would be constructed in place of the existing facilities.
Emergency Services/ Wildland Fire Facility	Existing facilities would continue to be used.	A new facility would be constructed in the vicinity of the water tanks.	A new facility would be constructed adjacent to the generator building.	A new facility would be constructed to the east of the existing administrative facilities.
Preservation Treatments of Exposed Frame Cabins	The cabins would not be rehabilitated and wildland fire crews would continue to be housed in old trailers, cabins, or tents.	All 26 exposed frame cabins and 2 associated buildings would be rehabilitated and would house the wildland fire crew.	All 26 exposed frame cabins and 2 associated buildings would be rehabilitated and would house the wildland fire crew.	All 26 exposed frame cabins and 2 associated buildings would be rehabilitated and would house the wildland fire crew.
Accomplishment of Project Objectives	Does not accomplish project objectives.	Accomplishes all project objectives.	Accomplishes some project objectives.	Accomplishes some project objectives.

Table 2-2. Comparative Summary of Environmental Impacts.

Impact Topic	No Action	Preferred Alternative	Generator Site	Administrative Site	Cumulative Impacts
Soil and Water Resources	No effects.	Negligible, local, adverse, long- and short-term effects through soil compaction and displacement, increase in impermeable surfaces, and potential increases in soil erosion.	Negligible, local, adverse, long- and short-term effects through soil compaction and displacement, increase in impermeable surfaces, and potential increases in soil erosion.	Negligible, local, adverse, long- and short-term effects through soil compaction, increase in impermeable surfaces, and displacement and potential increases in soil erosion.	Negligible to minor, local, adverse, long- and short-term effects through soil compaction and displacement, increase in impermeable surfaces, and potential increases in soil erosion.
Biotic Communities	No effects.	Negligible, adverse, local, short-term effects through disturbance during construction. Minor, adverse, site-specific, long-term effects through modification of approximately 0.4 ha (1.0 acre) of undisturbed ponderosa pine/white fir habitat and 0.4 ha (1.0 acre) of disturbed ponderosa pine/white fir habitat.	Negligible, adverse, local, short-term effects through disturbance during construction. Minor, adverse, site-specific, long-term effects through modification of approximately 0.4 ha (1.0 acre) of undisturbed ponderosa pine habitat and 0.4 ha (1.0 acre) of disturbed ponderosa pine habitat.	Negligible, adverse, local, short-term effects through disturbance during construction. Minor, adverse, site-specific, long-term effects through modification of approximately 0.8 ha (2.0 acres) of undisturbed ponderosa pine habitat.	Adverse, site-specific, long-term, minor impact on the vegetative community through modification of approximately 102 ha (253 acres) of montane conifer forest, or 1.3% of the watershed sub-unit. Up to 120-150 large trees would be removed for future projects. Tree removal would occur in small areas for individual projects in the existing developed areas of the North Rim. Minor, adverse, local, short- and long-term effects through disturbance and fragmentation.
Exotic Vegetation and Noxious Weeds	No effects.	Adverse, negligible, local, long-term impacts through increased potential for spread of noxious weeds on less than 0.4 ha (1.0 acre) of disturbed ground.	Adverse, negligible, local, long-term impacts through increased potential for spread of noxious weeds on less than 0.4 ha (1.0 acre) of disturbed ground.	Adverse, negligible, local, long-term impacts through increased potential for spread of noxious weeds on less than 0.4 ha (1.0 acre) of disturbed ground.	Minor, adverse, local, long-term impacts through previous establishment of exotic vegetation and the potential for spread of exotic vegetation on 7.7 ha (19 acres) of additional disturbed ground.

Table 2-2. Comparative Summary of Environmental Impacts.

Impact Topic	No Action	Preferred Alternative	Generator Site	Administrative Site	Cumulative Impacts
Special Status Species – Mexican Spotted Owl	No effects.	Modification of approximately 0.8 ha (2.0 acres) of potential foraging habitat that qualifies as critical habitat could have negligible, adverse, local, long-term effects on the spotted owl and minor, adverse, site-specific, long-term effects on critical habitat. This alternative may affect, is likely to adversely affect, the Mexican spotted owl.	Modification of approximately 0.8 ha (2.0 acres) of potential foraging habitat could have negligible, adverse, local, long-term effects on the spotted owl. This alternative may affect, but is not likely to adversely affect, the Mexican spotted owl.	Modification of approximately 0.8 ha (2.0 acres) of potential foraging habitat could have negligible, adverse, local, long-term effects on the spotted owl. This alternative may affect, but is not likely to adversely affect, the Mexican spotted owl.	Modification of potential foraging habitat and daily human activity at the Bright Angel Peninsula would constitute negligible to minor, adverse, local, long-term effects on Mexican spotted owls.
Special Status Species – California Condor	No effects.	Short-term, local, negligible, adverse effects through increased likelihood of contact between condors and humans during construction. This alternative may affect, but is not likely to adversely affect, the California condor.	Short-term, local, negligible, adverse effects through increased likelihood of contact between condors and humans during construction. This alternative may affect, but is not likely to adversely affect, the California condor.	Short-term, local, negligible, adverse effects through increased likelihood of contact between condors and humans during construction. This alternative may affect, but is not likely to adversely affect, the California condor.	Short- and long-term, local, negligible, adverse effects through increased likelihood of contact between condors and humans. .
Special Status Species – Northern Goshawk	No effects.	Negligible, adverse, local, long- and short-term effects through disturbance during construction and loss or modification of approximately 0.8 ha (2.0 acres) of potential nesting and foraging habitat.	Negligible, adverse, local, long- and short-term effects through disturbance during construction and loss or modification of approximately 0.8 ha (2.0 acres) of potential nesting and foraging habitat.	Negligible, adverse, local, long- and short-term effects through disturbance during construction and loss or modification of approximately 0.8 ha (2.0 acres) of potential nesting and foraging habitat.	Minor, adverse, short- and long-term, local effects on northern goshawks through daily disturbance in developed areas during the breeding season and modification of potential nesting and foraging habitat.
Special Status Species – American Peregrine Falcon	No effects.	Negligible, adverse, local, long-term effects through modification of <0.8 ha (2.0 acres) of potential foraging habitat.	Negligible, adverse, local, long-term effects through modification of <0.8 ha (2.0 acres) of potential foraging habitat.	Negligible, adverse, local, long-term effects through modification of <0.8 ha (2.0 acres) of potential foraging habitat.	Negligible, adverse, local, long-term effects through modification of approximately 102 ha (253 acres) of potential foraging habitat.

Table 2-2. Comparative Summary of Environmental Impacts.

Impact Topic	No Action	Preferred Alternative	Generator Site	Administrative Site	Cumulative Impacts
Special Status Species – Kaibab Squirrel	No effects.	Minor, adverse, local, long-term effects through removal of 65-85 ponderosa pine trees > 30.5 cm (12 inches) dbh on approximately 0.8 ha (2.0 acres) of ponderosa pine/white fir habitat.	Negligible, adverse, local, long-term effects through removal of 20-40 ponderosa pine trees > 30.5 cm (12 inches) dbh on approximately 0.8 ha (2.0 acres) of ponderosa pine habitat.	Negligible, adverse, local, long-term effects through removal of 20-40 ponderosa pine trees > 30.5 cm (12 inches) dbh on approximately 0.8 ha (2.0 acres) of ponderosa pine habitat.	Minor to moderate, adverse, local, long-term effects through loss or modification of potential nesting, foraging, and sheltering sites on approximately 39 ha (97 acres) of ponderosa pine habitat.
Cultural Resources	Minor, adverse, long-term effects through continued deterioration of the exposed frame cabins.	Moderate, beneficial, long-term effects through preservation treatments of exposed frame cabins. Emergency services/wildland fire facility would have minor, adverse, long-term effects on the historic cultural landscape.	Moderate, beneficial, long-term, site-specific effects through preservation treatments of exposed frame cabins. Emergency services/wildland fire facility would have moderate, adverse, long-term effects on the North Rim Headquarters Historic District and the historic cultural landscape.	Moderate, beneficial, long-term, site-specific effects through preservation treatments of exposed frame cabins. Emergency services/wildland fire facility would have moderate, adverse, long-term effects on the North Rim Headquarters Historic District and the historic cultural landscape.	Adverse cumulative effects would be moderate, local, and long-term and would be primarily the result of past actions. Beneficial cumulative effects under the action alternatives would be moderate, long-term, and site-specific.
Viewscapes	Minor, adverse, long-term, site-specific effects through continued deterioration of the exposed frame cabins.	Minor, beneficial, long-term, site-specific effects through preservation treatments of exposed frame cabins. Emergency services/wildland fire facility would have adverse effects that are minor, long-term, and site-specific and moderate, short-term, and site-specific.	Minor, beneficial, long-term, site-specific effects through preservation treatments of exposed frame cabins. Emergency services/wildland fire facility would have moderate, adverse, long-term, site-specific effects.	Minor, beneficial, long-term, site-specific effects through preservation treatments of exposed frame cabins. Emergency services/wildland fire facility would have adverse effects that are moderate, long-term, and site-specific and minor, short-term, and site specific.	Beneficial cumulative impacts to viewscapes would be long-term, minor, and site-specific. Adverse cumulative impacts would be moderate, site-specific, and long-term and minor, site-specific, and short-term.

Table 2-2. Comparative Summary of Environmental Impacts.

Impact Topic	No Action	Preferred Alternative	Generator Site	Administrative Site	Cumulative Impacts
Visitor Experience	No effect.	Minor, local, short-term, adverse effects through increased noise and traffic delays and congestion.	Minor, local, short-term, adverse effects through increased noise and traffic congestion. Moderate, local, long-term, adverse effects through creation of a traffic hazard.	Minor, local, short-term, adverse effects through increased noise and traffic congestion. Minor, local, long-term, adverse effects through possible confusion for visitors trying to reach the backcountry office.	Short-term cumulative impacts to the visitor experience would be adverse, moderate, and local. Long-term cumulative effects on the visitor experience would be beneficial, moderate, and local.
Park Operations	Long-term, adverse, moderate, local effects on park operations through continuation of inefficient operations, increasing maintenance required for old buildings, and difficulty in recruiting and retaining employees.	Long-term, beneficial, moderate, local effects on park operations through increased efficiency, decreased maintenance needs, and increased ability to recruit and retain employees.	Long-term, beneficial, moderate, local effects on park operations through increased efficiency, decreased maintenance needs, and increased ability to recruit and retain employees.	Long-term, beneficial, moderate, local effects on park operations through increased efficiency, decreased maintenance needs, and increased ability to recruit and retain employees.	Cumulative impacts on park operations would be long-term, beneficial, local, and moderate through improvements to infrastructure. Adverse, short-term, local, and minor to moderate impacts would also occur through disruptions in services.

CHAPTER 3 - AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This chapter describes the present condition (i.e., affected environment) within the project area and the changes (i.e., environmental consequences) that can be expected from implementing the action alternatives or taking no action at this time. The No-Action Alternative sets the environmental baseline for comparing the effects of the other alternatives. The impact topics (see Chapter 1) define the scope of the environmental concern for this project. NEPA requires that environmental documents disclose the environmental impacts of the proposed federal action, reasonable alternatives to that action, and any adverse environmental effects that cannot be avoided should the proposed action be implemented. The environmental effects, or changes from the present baseline condition, described in this chapter reflect the identified relevant impact topics and include context, intensity, and duration of impacts; indirect impacts; cumulative impacts; and measures to mitigate for impacts. NPS policy also requires that "impairment" of resources be evaluated in all environmental documents.

Grand Canyon National Park encompasses approximately 485,625 ha (1.2 million acres) in northern Arizona. The project is located on the North Rim. The entire North Rim drains south into the Grand Canyon. Although it appears relatively flat, numerous drainages and canyons cut the North Rim. Climatic conditions in the Grand Canyon region are diverse and elevation-based. Most of the precipitation comes from summer thunderstorms and winter rain and snow. The project area is located on Bright Angel Peninsula, a narrow portion of the Kaibab Plateau on which most of the development on the North Rim is located. The project area is on relatively flat terrain at approximately 2,530 m (8,300 feet) in elevation and receives an average of 63.2 cm (25 inches) of precipitation and an average annual snow fall of 356 cm (140 inches). Average winter (January) temperature is -3 degrees C (27 degrees F) and average summer (July) temperature is 17 degrees C (62 degrees F).

METHODOLOGY

The impact analyses and conclusions contained in this chapter were based on Park staff knowledge of the resources and site, review of existing literature and Park studies, information provided by specialists within the NPS and other agencies, and professional judgment. Potential impacts are described in terms of type (beneficial or adverse), context (site-specific, local, or regional), duration (short-term, lasting less than 5 years, or long-term, lasting more than 5 years), and intensity (negligible, minor, moderate, or major). Because definitions of intensity vary by impact topic, intensity definitions are provided separately for each impact topic analyzed in this EA.

Cumulative Impacts

Cumulative impact is defined as the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7). Therefore it is necessary to identify other past, ongoing, or foreseeable future projects at the North Rim and in the surrounding area. The area of cumulative impact was chosen to be the Bright Angel Peninsula sub-unit of the Bright Angel watershed. This sub-unit is approximately 7,857 ha (19,415 acres) in size and includes the 138-ha (340-acre) Bright Angel Peninsula and Highway 67 toward the North Rim entrance station (Figure 6). The area of impact was chosen to be the Bright Angel watershed

sub-unit because of the potential for impacts of multiple actions on the natural environment within one watershed.

Past and present activities that have affected the Bright Angel Peninsula and the surrounding area include the Outlet Fire, prescribed burns, and existing development and visitation at the North Rim. Existing developments (roads, trails, parking areas, buildings, and utilities) have affected approximately 95 ha (234 acres) within the Bright Angel watershed sub-unit (Figure 7). The North Rim receives most of its visitation between May and October, when facilities at the North Rim are open. Visitation peaks in the summer months of June and July and is very limited in winter when snow blocks the road. Park staff are present at the North Rim throughout the year and perform general maintenance functions.

The Outlet Fire burned approximately 5,666 ha (14,000 acres) on the North Rim in May 2000. Approximately 1,526 ha (3,772 acres) of the burn occurred in the Bright Angel Peninsula sub-unit. The fire burned in a mosaic pattern, with areas of low, moderate, and high burn severities throughout the fire perimeter. Areas with higher burn intensities are experiencing successful aspen regeneration, indicating that a type conversion from a primarily mixed conifer stand to a stand dominated by aspen may be occurring in some areas of the fire. Long-term monitoring using fixed plots designed to evaluate fire effects over time is in place across much of the Outlet Fire (C. Letz, personal communication, 3 December 2002). Prescribed burning has been conducted on 892 ha (2,203 acres) within the watershed sub-unit since 1997. Prescribed burning on the North Rim is designed to reduce hazardous fuel accumulation and restore fire to the ecosystem to reduce the risk of large-scale stand replacing wildfire on the North Rim. Broadcast prescribed burning is the primary tool used on areas outside the Bright Angel Peninsula developed area to reduce hazardous fuel accumulations. Both broadcast prescribed burning and understory thinning are used in developed areas to reduce the risk of wildfire and to protect developments and structures in these areas.

For this analysis, foreseeable future actions were considered to be actions that currently have funding or for which funding is being sought and that could occur within the next five years. Five years was selected as the period for foreseeable future actions because many of the actions identified in the GMP are likely to be either planned or implemented by that time. Twenty improvement projects, in addition to the proposed action, are planned within the Bright Angel Peninsula subwatershed and would result in disturbance to approximately 6.9 ha (17 acres) of ground. Most of this area has been previously disturbed. Approximately 45-75 trees greater than 30.5 cm (12 inches) in diameter at breast height (dbh) would be removed for these projects. These projects are summarized in Appendix B and displayed in Figure 6. Projects on the Bright Angel Peninsula are also displayed on Figure 8. Over the next five years, prescribed fire is planned for 405 ha (1,000 acres) in 2004 and 202 ha (500 acres) in 2006 within the Bright Angel Peninsula sub-unit.

Cumulative impacts are expected to be similar for any alternative selected because of the small amount of disturbance relative to the watershed as a whole. If the No-Action Alternative were selected, and all other future projects were implemented, the impacts to the natural environment would still be similar to those that would occur if any one of the action alternatives for this project were selected. The differences between the action alternatives are also not measurable, when combined with other future actions on a watershed level. Therefore, the analysis applies to any alternative selected.

Figure 6. Bright Angel Watershed Sub-unit.

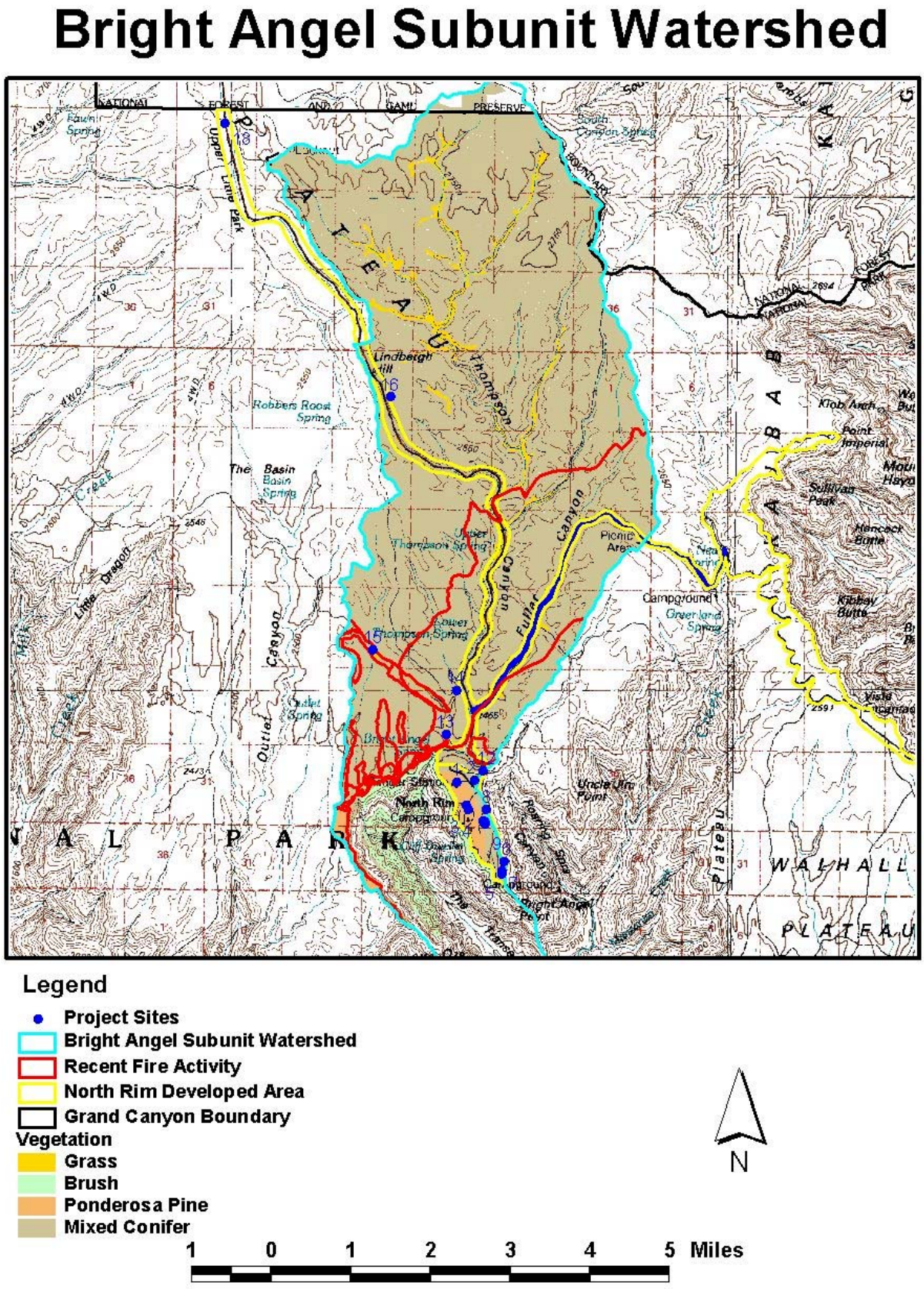


Figure 7. North Rim developed area on Bright Angel Peninsula.

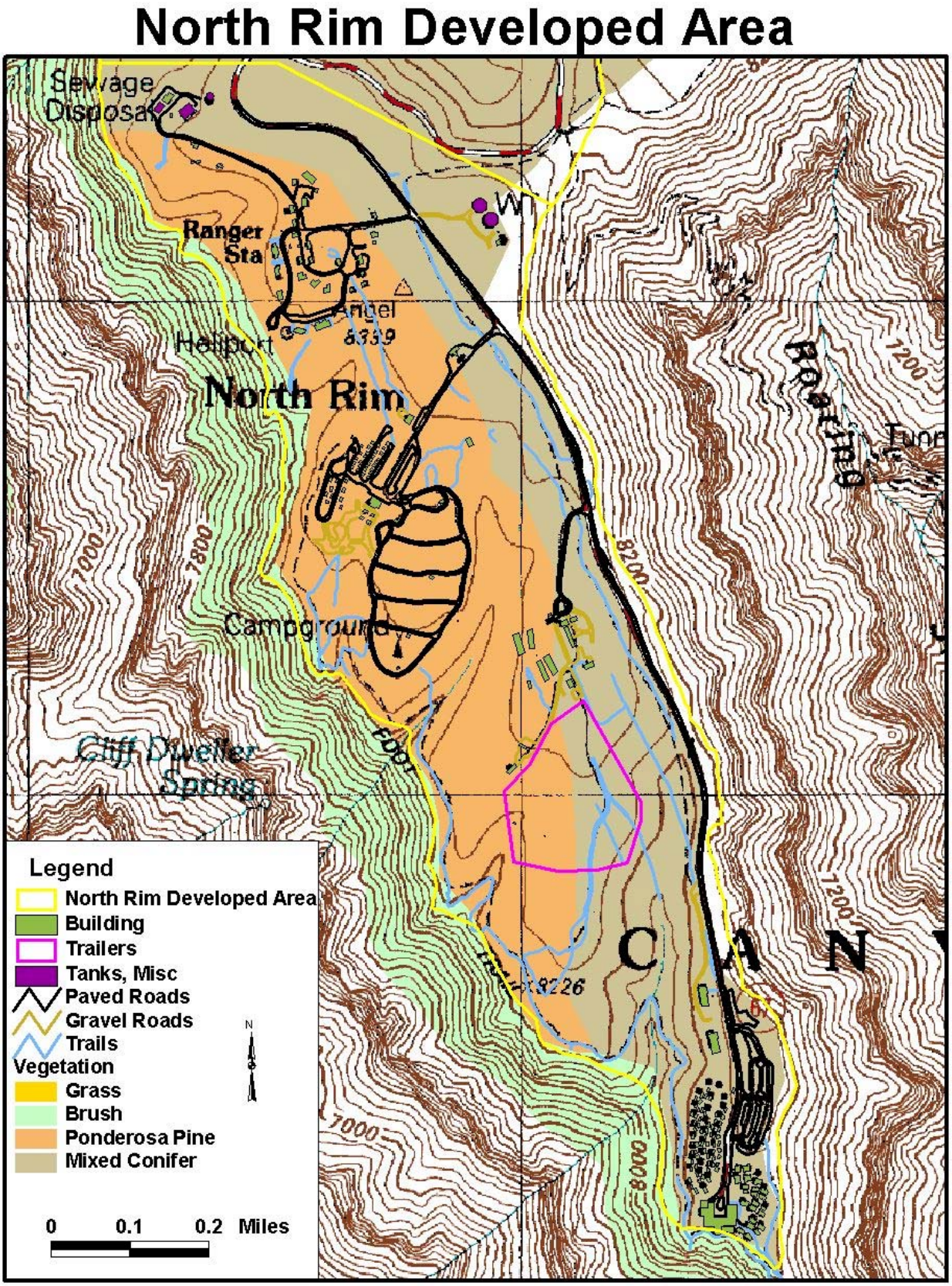
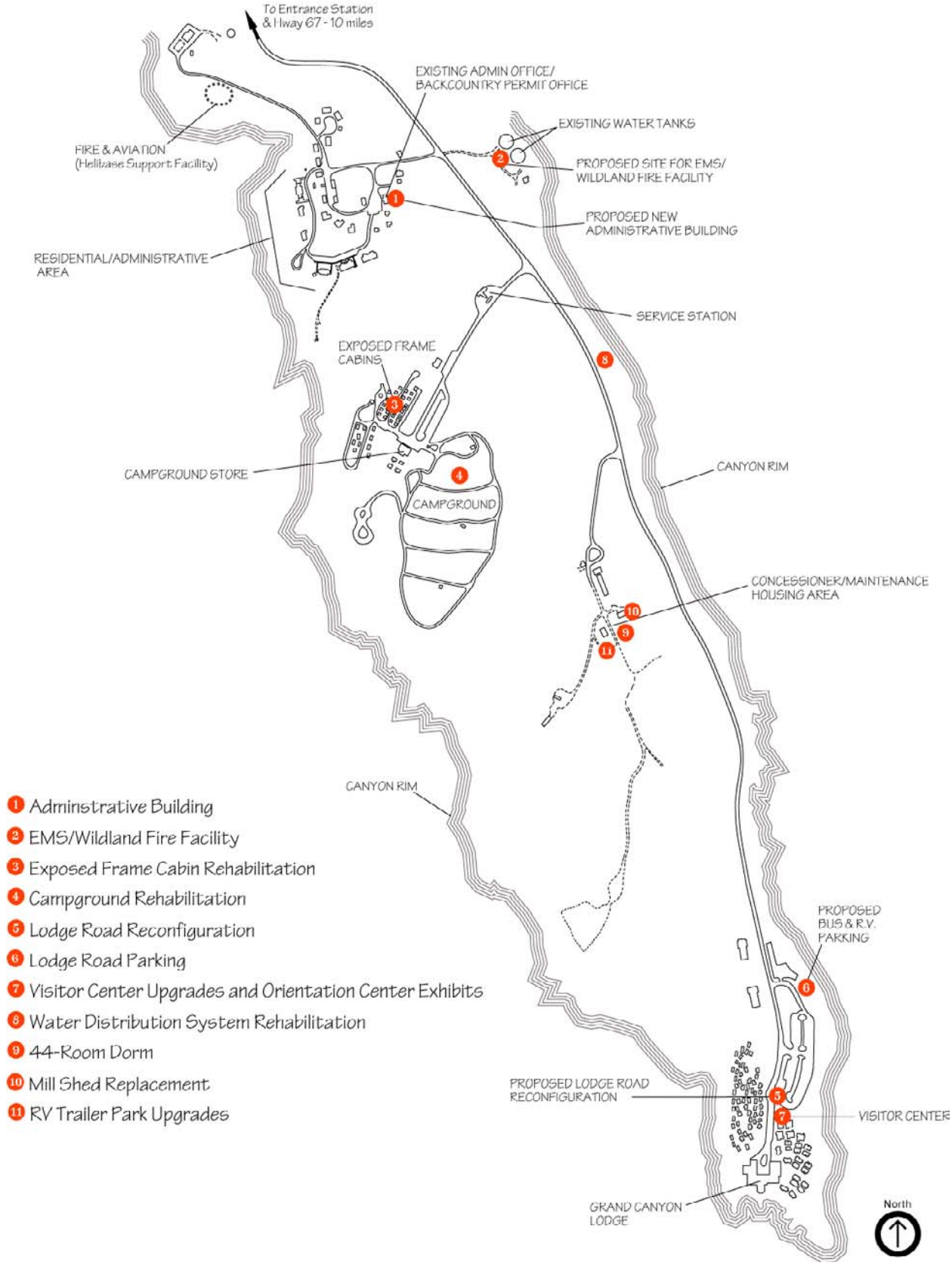


Figure 8. Foreseeable future projects in North Rim developed area.



Impairment

In addition to determining the environmental consequences of the preferred and other alternatives, NPS policy (NPS 2001b) requires analysis of potential effects to determine whether or not actions would impair Park resources.

The fundamental purpose of the national park system, established in the Organic Act and reaffirmed by the General Authorities Act, as amended, is to conserve park resources and values. NPS managers must always seek ways to avoid, or to minimize to the greatest degree practicable, adverse impacts on park resources and values. However, the laws do give the NPS the management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of the park, as long as the impact does not constitute impairment of the affected resources and values, unless a particular law directly and specifically provides otherwise. Impairment is an impact so severe that, in the professional judgment of a responsible NPS manager, it would harm the integrity of park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values, and would violate the 1916 NPS Organic Act. An impact to any park resource or value may constitute impairment. An impact would be more likely to constitute impairment if it affects a resource or value whose conservation is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the park;
- key to the natural or cultural integrity of the park or to the opportunities for enjoyment of the park; or
- identified as a goal in the park's general management plan or other relevant NPS planning document.

Impairment may result from NPS activities in managing the park, visitor activities, or activities undertaken by concessioners, contractors, and others operating in the park.

SOIL AND WATER RESOURCES

Affected Environment

The developed areas of the North Rim, including the project location, are underlain by Kaibab limestone, a very porous rock layer. Surface water in the North Rim developed area occurs only following severe storm events because water penetrates through the soil and rock layers quickly. Soils tend to be shallow and poorly developed but stable, with frequent rock outcroppings. Soil horizons and structure are well developed and are well drained.

Environmental Consequences

The thresholds of change for the intensity of an impact on soil and water resources are defined as follows:

Negligible – a change to soil or water resources that is not measurable or perceptible.

Minor – a measurable or perceptible, small, localized change to soil or water resources. The change is of little consequence.

Moderate – a change to soil or water resources that is measurable and of consequence but is localized.

Major – a measurable change to soil or water resources that is large and/or widespread and could have permanent consequences for the resource.

Alternative A – No Action

Direct/Indirect Effects. Approximately 95 ha (234 acres) of soil have been disturbed for existing developments in the Bright Angel Peninsula subwatershed. Construction activities can result in reduced water infiltration, reduced soil porosity, reduced water holding capacity, reduced aeration of the soil, increased surface runoff, and increased soil erosion (except in those areas that are covered by impervious surfaces) through the compaction and displacement of soil. Because of the high porosity of the soils, low rainfall, and lack of steep slopes at the North Rim, these effects have been minor. The impacts to soil and water resources have been adverse, minor, local, and long-term. No construction activities are proposed under Alternative A, and this alternative would result in no additional effects to soil and water resources.

Effects Common to All Action Alternatives

Direct/Indirect Effects. Approximately 0.8 ha (2.0 acres) of soil would be disturbed under any of the alternatives. Of this area, 0.45 ha (1.1 acres) would be covered with buildings, pavement, or other impervious surfaces and would not be susceptible to future erosion. Despite the increase of impermeable surfaces created by the proposed emergency services/wildland fire facility, the majority of water would continue to be lost through percolation, and surface runoff from the North Rim would remain associated with severe storm events. The quality of ground and surface water would not be measurably affected by the proposed developments.

Soils within the 0.45-ha (1.1-acre) area would be converted from undisturbed and productive soil to developed and unproductive soil. The Bright Angel watershed sub-unit is approximately 7,857 ha (19,415 acres) in size. The removal of 0.45 ha (1.1 acres) of productive soil within this watershed is not substantial and is not expected to result in any measurable changes to the soil resource within the watershed as a whole. The remaining disturbed areas would be revegetated and would not be subject to increased erosion after plants are reestablished. Any increases in sedimentation during construction activities would be minimal because of the lack of surface water runoff and implementation of standard soil erosion control measures. In addition, the potential impacts of increased sedimentation would be limited to the period of construction and vegetation recovery. Mitigation measures that have been included for the action alternatives are designed to minimize soil disturbance and increased runoff during construction. Therefore, direct and indirect effects to the soil and water resources under any of the action alternatives would be negligible, local, adverse, and both long- and short-term.

Cumulative Impacts

Past and present development has resulted in soil compaction and displacement on approximately 95 ha (234 acres) within the Bright Angel Peninsula sub-unit. The Outlet Fire burned approximately 1,526 ha (3,772 acres) in the Bright Angel Peninsula sub-unit in May 2000. The fire burned in a mosaic pattern, with areas of low, moderate, and high burn severities throughout the fire perimeter. The short-term impacts of this fire on soil and water resources include increased soil movement, soil loss, and sedimentation into downstream drainages. These short-term impacts are minor and should stabilize within 3-5 years. Prescribed burning has been conducted on 892 ha (2,203 acres) within the watershed sub-unit since 1997 and is planned for 607 ha (1,500 acres) acres in the next 5 years. Prescribed burns are generally of low intensity and have negligible effects on soil resources. Other reasonably foreseeable future actions would affect approximately 6.9 ha (17 acres) of soil and could result in soil compaction and

displacement. Mitigation measures would be implemented for these future actions and would minimize effects on soil erosion and surface water. Any increases in soil erosion would be limited to the period of construction and vegetation recovery. The cumulative effect of any action alternative, in combination with other past, present, and reasonably foreseeable future actions, on soil and water resources in the Bright Angel Peninsula sub-unit would be negligible, long-term, and local and minor, short-term, and local.

Impairment

Adverse impacts under any alternative would be negligible to minor. Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the Park or to opportunities for enjoyment of the Park; or (3) identified as a goal in the Park's general management plan or other relevant NPS planning documents, there would be no impairment of the Park's resources or values.

Conclusion

The No-Action Alternative would result in the least impact to soil and water resources. Impacts to soil and water resources would be comparable among all action alternatives and would be expected to be negligible. Cumulative impacts would be negligible to minor, and none of the alternatives would result in impairment of soil or water resources.

BIOTIC COMMUNITIES

Affected Environment

The major vegetation type on the North Rim is Rocky Mountain montane conifer woodland. Four montane coniferous forest communities are distributed in broad elevation bands across the North Rim. At the highest elevations above 2,682 m (8,800 feet), mixed conifer forest is dominated by Engelmann spruce (*Picea engelmanni*), white fir (*Abies concolor*), ponderosa pine (*Pinus ponderosa*), and Douglas fir (*Pseudotsuga menziesii*). Between 2,560 and 2,682 m (8,400 and 8,800 feet), ponderosa pine and Douglas fir dominate the vegetation community. Below this, from about 2,438 to 2,560 m (8,000 to 8,400 feet), the community is dominated by ponderosa pine and white fir. Ponderosa pine is a single dominant in a broad belt from about 2,438 m (8,000 feet) to the plateau rim at 2,316 m (7,600 feet). The one abundant deciduous tree on the North Rim is quaking aspen (*Populus tremuloides*), and it is common throughout all of these forest communities (Warren et al. 1982). Understory deciduous shrubs common to all forest types include Gambel oak (*Quercus gambelii*), New Mexican locust (*Robinia neomexicana*) and service berry (*Amelanchier* spp.).

The proposed site of the emergency services/wildland fire facility under Alternative B is vegetated by ponderosa pine with slight white fir encroachment. The sites under Alternative C and Alternative D and the areas around the exposed frame cabins and the helibase are vegetated by ponderosa pine (Spotskey and Bertolette 2000). The physiognomy of the ponderosa pine type includes open park-like stands, deciduous shrubs patchily distributed in clumps in the understory, and variable herbaceous ground cover. Quaking aspen also occurs within this type, typically in drainages at the higher elevations (Warren et al. 1982). Vegetation surrounding the exposed frame cabins consists primarily of ponderosa pine and quaking aspen. Understory trees and brush have been cleared from this area.

Mammals typically associated with montane conifer forests on the North Rim include porcupine, mule deer, 19 species of bats, montane voles, chipmunks, and Kaibab squirrels. Birds include red-faced warbler, pine siskin, yellow-rumped warbler, pygmy nuthatch, western bluebird, blue grouse, Merriam's turkey, and several species of hawks (red-tailed hawk, Cooper's hawk, sharp-shinned hawk, and northern goshawk). Amphibians and reptiles include tiger salamander, northern leopard frog, western rattlesnake, ringneck snake, and western skink (Brown 1994). Those species that are not considered special status species, but for which there is interest in and concern for their populations on the North Rim, are listed in the following table and discussed briefly below. This list was developed based on input from biologists from the Park, AGFD, and USFWS.

Table 3-1. Wildlife species of interest on the North Rim.

Common Name	Scientific Name
Mule deer	*Odocoileus hemionus*
Merriam's turkey	*Meleagris gallopavo merriami*
Desert bighorn sheep	*Ovis canadensis*
Mountain lion	*Felis concolor*
Voles and shrews	*Microtus* spp. and *Sorex s*pp.
Breeding birds	Various species, see below

The proposed emergency services/wildland fire building would be built in habitat suitable for mule deer, turkey, voles and shrews, and breeding birds. Because the project area is relatively small, it is unlikely that mule deer or turkeys would rely solely on the project area for their habitat requirements. Mountain lions and bighorn sheep may travel through the project area, but it does not provide key habitat for these species because it is within the developed area of the North Rim on the Bright Angel Peninsula and existing use by visitors and employees in this area is moderate to high during peak season.

Breeding Birds. The Arizona Working Group of Partners in Flight developed a Bird Conservation Plan (Latta et al. 1999) as part of a national effort to address the concern for the future of migratory and resident birds. The Conservation Plan lists priority bird species by habitat type and identifies management actions that will benefit those species. The Conservation Plan identifies northern goshawk, Mexican spotted owl, and olive-sided flycatcher as priority species in mixed conifer habitat and northern goshawk, olive-sided flycatcher, cordilleran flycatcher, and purple martin as priority species in pine habitat. Combined, these priority species, as well as species associated with them, use the entire range of structural levels from grasses to the top of the canopy. Goshawks and spotted owls are also considered special status species and will be discussed below. Management recommendations for habitat for the olive-sided flycatcher include maintaining or creating tall snags for perches and applying presettlement restoration treatments. Recommendations for forest management that would benefit breeding birds came out of a study by Rosenstock (1996) that included a study site in Grand Canyon National Park. Recommendations pertinent to this project include retention of snags, Gambel oaks, and large old ponderosa pine, particularly those equal to or greater than 24 inches dbh.

Environmental Consequences

The thresholds of change for the intensity of an impact on biotic communities are defined as follows:

Negligible – a change to a biotic resource or to a population or individuals of a species that is not measurable or perceptible.

Minor – a measurable or perceptible, small, localized change to a biotic resource or to a population or individuals of a species. The change is of little consequence.

Moderate – a change to a population or individuals of a species or resource that is measurable and of consequence but is localized.

Major – a measurable change to a biotic resource or to a population or individuals of a species. The change is large and/or widespread and could have permanent consequences for the species or resource.

Alternative A – No Action

Direct/Indirect Effects. Approximately 95 ha (234 acres) of montane conifer forest have been modified by existing developments in the Bright Angel Peninsula subwatershed. This impact to biotic communities is adverse, site-specific or local, minor, and long-term. No vegetation manipulation or construction activities are proposed under Alternative A, and this alternative would result in no additional effects to the biotic community.

Effects Common to All Action Alternatives

Direct/Indirect Effects. No vegetation would be removed for preservation treatments of the exposed frame cabins or construction of the helibase support facility. Loss of habitat for construction of the emergency services/wildland fire facility would likely have negligible, adverse, local, short- and long-term effects on wildlife populations. A direct loss of some individuals could occur during construction activities. However, the majority of small mammals, birds, and reptiles that are currently utilizing the habitat that is proposed for clearing would be displaced to adjacent habitat. In addition to loss of habitat, impacts of implementing the action alternatives would include decreased wildlife security, increased disturbance to adjacent habitat, and increased fragmentation. However, these impacts would be negligible because they would occur in areas currently degraded because of high disturbance levels from existing developments, roads, utility corridors, and human use. Clearing of the proposed facility site could result in a loss of foraging habitat and cover for deer, turkey, voles/shrews, and breeding birds. Therefore, the action alternatives may impact individuals of Species of Interest, but, because of the small size of the project area and the implementation of mitigation measures, are not likely to result in a trend toward federal listing or loss of population viability for these species.

Alternative B – Preferred Alternative

Direct/Indirect Effects. Approximately half of the proposed site for the emergency services/wildland fire facility has been disturbed by previous construction. Under the Preferred Alternative, approximately 0.4 ha (1.0 acre) of undisturbed ponderosa pine forest with slight white fir encroachment would be removed or modified at the site of the proposed emergency services/wildland fire facility. Trees on the proposed site for the emergency services/wildland fire facility that would be affected by the project include ponderosa pine, white fir, and quaking aspen. Ponderosa pine forms the overstory layer, with trees in excess of 61 cm (24 inches) dbh. White fir is common in the understory and mid-canopy, and quaking aspen is scattered throughout the area. Approximately 65-85 ponderosa pine > 30.5 cm (12 inches) dbh, 2-5 of which are > 61 cm (24 inches) dbh, would be removed for construction of the facility. In addition, 5-10 aspen trees between 25 and 30.5 cm (10 and 12 inches) dbh would be removed. Removal of vegetation at this site would constitute a long-term loss of habitat because the majority of the cleared area would become buildings or parking lots. Loss of habitat would be a minor, adverse, site-specific, long-term effect to the biotic community.

Alternative C – Generator Site

Direct/Indirect Effects. Approximately half of the site for the emergency services/wildland fire facility proposed under Alternative C has been disturbed by previous construction. Under this alternative, approximately 0.4 ha (1.0 acre) of undisturbed ponderosa pine forest would be removed or modified. No formal tree survey of the site has been completed, but tree removal is estimated at 20-40 ponderosa pine > 30.5 cm (12 inches) dbh. Removal of vegetation at this site would constitute a long-term loss of habitat because the majority of the cleared area would become buildings or parking lots. Loss of habitat would be a minor, adverse, site-specific, long-term effect to the biotic community.

Alternative D – Administrative Site

Direct/Indirect Effects. The site for the emergency services/wildland fire facility under Alternative D is essentially undisturbed. Construction of the facility at this site would result in the removal or modification of approximately 0.8 ha (2.0 acres) of undisturbed ponderosa pine forest. No formal tree survey of the site has been completed, but tree removal is estimated at 20-40 ponderosa pine > 30.5 cm (12 inches) dbh. Removal of vegetation at this site would constitute a long-term loss of habitat because the majority of the cleared area would become buildings or parking lots. Loss of habitat would be a minor, adverse, site-specific, long-term effect to the biotic community.

Cumulative Impacts

Past and present development has resulted in impacts to approximately 95 ha (234 acres) of montane conifer forest within the Bright Angel Peninsula sub-unit. The Outlet Fire burned approximately 1,526 ha (3,772 acres) in the Bright Angel Peninsula sub-unit in May 2000. The intensity of the fire varied, and the rate of vegetation recovery within the fire perimeter also varies. Because burned areas will recover and are providing suitable habitat for a variety of wildlife and plant species, the effect of the fire is not considered a net loss of habitat. Prescribed burning has been conducted on 892 ha (2,203 acres) within the watershed sub-unit since 1997 and is planned for 607 ha (1,500 acres) in the next 5 years. Prescribed burns are generally of small size and low intensity and do not result in loss of habitat. Fires may result in direct mortality or temporary displacement of wildlife. Other reasonably foreseeable future actions would affect approximately 6.9 ha (17 acres) of montane conifer forest. Removal of 45-75 trees > 30.5 cm (12 inches) dbh is expected and would constitute a minor, long-term, site-specific, adverse effect to the vegetative community. Effects of foreseeable future actions on the wildlife community would include disturbance during construction, displacement, and increased habitat fragmentation. These local, adverse, long- and short-term impacts would be negligible to minor because all activities would occur in areas that are already disturbed by existing developments and activities. The cumulative effects of any action alternative, in combination with other past, present, and reasonably foreseeable future actions, on biotic resources in the Bright Angel Peninsula sub-unit would be minor, long- and short-term, site-specific or local, and adverse.

Impairment

Adverse impacts to the biotic community under any alternative would be minor. Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the Park or to opportunities for enjoyment of the Park; or (3) identified as a goal in the Park's general management plan or other relevant NPS planning documents, there would be no impairment of the Park's resources or values.

Conclusion

The No-Action Alternative would result in the least impact to biotic communities. Of the action alternatives, Alternative D would result in disturbance to the largest area of previously undisturbed vegetation, and Alternatives B and C would result in disturbance to equal areas of previously undisturbed vegetation. However, Alternative B would result in the removal of approximately 65-85 ponderosa pine > 30.5 cm (12 inches) dbh, while Alternatives B and C would result in the removal of 20-40 ponderosa pine > 30.5 cm (12 inches) dbh. Any action alternative would result in negligible, local, short-term, adverse effects and minor, site-specific, long-term, adverse effects. The effect of any action alternative, when combined with past, present, and reasonably foreseeable future actions, would be minor, long- and short-term, site-specific or local, and adverse. These effects would not constitute impairment.

EXOTIC VEGETATION AND NOXIOUS WEEDS

Affected Environment

There are 19 exotic plant species of primary concern on the North Rim (Table 3-2). Eight of these have a high urgency ranking. These would be the focus of surveys and mitigation measures to minimize the potential for introduction or spread of exotic vegetation in the project area. Exotic vegetation is not considered to be a major problem at the North Rim. However, there is the potential that exotic vegetation could become a problem because of ground disturbance and increased risk of spread of noxious weeds. The majority of the exotics found at the North Rim occur in previously disturbed areas and along roads.

Environmental Consequences

The thresholds of change for the intensity of an impact on noxious weeds or exotic vegetation are defined as follows:

Negligible – a change in the distribution or density of noxious weeds or exotic vegetation that is not measurable or perceptible.

Minor – a measurable or perceptible, small, localized change in the distribution or density of noxious weeds or exotic vegetation. The change is of little consequence.

Moderate – a change in the distribution or density of noxious weeds or exotic vegetation that is readily measurable and of consequence but is localized.

Major – a large and/or widespread change in the distribution or density of noxious weeds or exotic vegetation.

Table 3-2. Exotic plant species of concern at the North Rim.

Common Name	Scientific Name	Urgency Ranking
Red top grass	*Agrostis stolonifera*	High
Smooth brome	*Bromus inermis*	High
Oxeye daisy	*Chrysanthemum leucanthrum*	High
Houndstongue	*Cynoglossum officinale*	High
Orchard grass	*Dactylis glomerata*	High
Dalmatian toadflax	*Linaria dalmatica*	High
Horehound	*Marrubium vulgare*	High
Johnson grass	*Sorghum halepense*	High
Cheatgrass	*Bromus tectorum*	Medium
Quackgrass	*Elymus repens*	Medium
Bedstraw	*Galium aparine*	Medium
Perennial ryegrass	*Lolium perenne*	Medium
Annual sweet clover	*Melilotus officinalis*	Medium
Common timothy	*Phleum pratense*	Medium
Buckhorn plaintain	*Plantago lanceolata*	Medium
Kentucky bluegrass	*Poa pratensis*	Medium
Rabbitfoot grass	*Polypogon monspeliensis*	Medium
Sheep sorrel	*Rumex acetosella*	Medium
Common dandelion	*Taraxacum officinale*	Medium

Alternative A – No Action

Direct/Indirect Effects. The construction of existing roads and buildings in the Bright Angel Peninsula subwatershed has resulted in the presence of exotic vegetation in these areas. Approximately 95 ha (234 acres) of ground have been disturbed for the construction of existing visitor services, housing, roads, and utilities. Ongoing exotic vegetation control programs, which include hand pulling, mechanical treatments, and a small amount of herbicide control, would continue under the No-Action Alternative. Because the size of the current program is limited, existing populations of exotic vegetation could continue to spread and slowly replace native vegetation. This would most likely occur along roads and utility corridors. These impacts would be minor, adverse, local, and long-term. This alternative would not implement any new ground-disturbing activities and thus would have no direct effects on exotic vegetation or noxious weeds.

Effects Common to All Action Alternatives

Direct/Indirect Effects. No new ground would be disturbed for the preservation treatments of the exposed frame cabins or construction of the helibase support facility. Approximately 0.8 ha (2.0 acres) of ground would be disturbed for the emergency services/wildland fire facility at the North Rim under any of the action alternatives. Ground disturbance would increase the potential for the spread or introduction of exotic vegetation. However, approximately 0.45 ha (1.1 acres) of the disturbed areas would not be subject to potential exotic vegetation invasion because this area would be covered by impervious surfaces. In addition, mitigation measures such as pressure washing of ground-disturbing equipment would substantially reduce the risk of introducing a new exotic species. Post-construction revegetation would also reduce the risk of spreading existing populations and introducing new species. Overall impacts of any action alternative would therefore be adverse, negligible, local, and long-term.

Cumulative Impacts

Past and present development has disturbed approximately 95 ha (234 acres) of ground in the Bright Angel Peninsula sub-unit as has resulted in the presence of exotic vegetation in some disturbed areas. The Outlet Fire burned approximately 1,526 ha (3,772 acres) within the Bright Angel Peninsula subwatershed in May 2000. Exposed soils in severely burned areas could provide opportunities for wind-dispersed noxious weeds to become established. Prescribed burning has been conducted on 892 ha (2,203 acres) within the watershed sub-unit since 1997 and is planned for 607 ha (1,500 acres) in the next 5 years. Prescribed burns are generally of small size and low intensity and would provide a negligible opportunity for the spread of noxious weeds. Foreseeable future developments would disturb approximately 6.9 ha (17 acres) in the Bright Angel Peninsula subwatershed area. A portion of this area would be covered by impervious surfaces and would not be subject to invasion by exotic species. Exotic vegetation and noxious weeds generally invade disturbed sites, and thus future developments would increase the potential for spread or introduction of exotic vegetation and noxious weeds. Project-specific mitigation measures would be implemented for any of the action alternatives and these future projects to reduce the potential for spread or introduction of exotic vegetation. The cumulative effects of any action alternative, in combination with other past, present, and reasonably foreseeable future actions, on exotic vegetation in the Bright Angel Peninsula sub-unit would minor, adverse, local, and long-term.

Conclusion

The No-Action alternative would not result in additional ground disturbance and would not increase the risk of spread or introduction of exotic plant species. Any of the action alternatives would result in the disturbance of approximately 0.8 ha (2 acres). All disturbed areas would either be covered with impervious surfaces or would be revegetated. Post-construction monitoring and treatment would ensure that adverse impacts from any action alternative would be negligible, local, and long-term. Cumulative impacts would be minor, adverse, local, and long-term.

SPECIAL STATUS SPECIES

The thresholds of change for the intensity of an impact on any special status species are defined as follows:

Negligible – a change to a population or individuals of a species or to designated critical habitat that is not measurable or perceptible.

Minor –a measurable, small, localized change to a population or individuals of a species or to designated critical habitat. The change is of little consequence.

Moderate – a change to a population or individuals of a species or to designated critical habitat. The change is measurable, localized, and of consequence.

Major – a measurable and large and/or widespread change to a population or individuals of a species or to designated critical habitat.

Mexican Spotted Owl

Affected Environment

The Mexican spotted owl (MSO; *Strix occidentalis lucida*) was listed as a threatened species in March 1993, and a recovery plan was issued in 1995. MSO typically breed and roost in deep canyon or diverse forested habitats. They are associated with late seral forests and are generally found in habitat that includes mixed conifer and pine-oak forests, riparian madrean woodland, and sandstone canyonlands (USFWS 1995). However, MSO have been found in relatively open shrub and woodland vegetation communities in arid canyonland habitat (Willey 1995).

Nesting habitat is typically in areas with complex forest structure or rocky canyons containing mature or old growth stands that are uneven-aged and multi-storied with high canopy closure. MSO usually nest in abandoned stick nests or in cavities in trees or cliffs. Tree nests can be on platforms such as old raptor nests or witches' brooms formed by dwarf mistletoe (*Arceuthobium* sp.) or in cavities formed by broken-off branches or tree tops. Nests in rock canyon areas are usually in cavities in the rocks or in caves (Ganey and Dick 1995).

The diet of the MSO varies depending on location and habitat. Generally it consists of small and medium-sized mammals such as peromyscid mice, voles (*Microtus* spp.), pocket gophers (*Thomomys* spp.), ground squirrels (*Spermophilus* spp.), and woodrats (*Neotoma* spp.). Woodrats are the most common and important prey item range-wide, as measured in frequency in the owls' diet and in biomass consumed (Ward and Block 1995). Other animals that may occasionally be consumed include small birds (usually Passeriformes), lizards (*Sceloporus* spp.), bats (Chiroptera), beetles (Coleoptera), and rabbits (*Sylvilagus* spp.). MSO use a wider variety of forest conditions when foraging than when nesting or roosting, and a diverse prey base is dependant on the availability and quality of diverse habitats. Spotted owls typically forage at night, although diurnal foraging has also been observed.

The presence of MSO within Grand Canyon National Park was confirmed in 1992 through field surveys of approximately 2,430 ha (6,000 acres) of suitable habitat on the North and South Rims. Additional MSO surveys occurred in 1994 and 1995 along the South Rim and in 1998 and 1999 along the North Rim. These surveys did not detect any spotted owls. In 1999, additional surveys were conducted in side canyon habitat along the Colorado River corridor and responses were received at six locations. Surveys continued along the river corridor in 2001, with new owls located (Willey and Ward, in prep.). An extensive owl survey was initiated in 2001 with crews surveying the inner canyon and river corridor, owl habitat below the North and South Rims, and portions of the North and South Rim plateaus. A second year of surveys for these same areas was completed in 2002. Surveys in the project area specific to Mexican spotted owls were conducted during 1998, 1999, 2001, and 2002.

Critical habitat for MSO was designated in 2001 and includes most of the Park except the South Rim. Owl habitat in Grand Canyon National Park is cool canyon habitat defined as areas with low thermal intensity, short thermal duration, and steep slopes (Spotskey and Willey 2000). Predicted habitat has been spatially defined through a geographic information system (GIS) model and may or may not include forested habitat; i.e., the cool temperatures and short thermal duration may be a result of vertical rock faces, cliff walls, and aspect and not necessarily because an area has dense vegetative canopy cover.

The size and extent of the MSO population at Grand Canyon is currently unknown. However, survey results suggest that MSO occupy the rugged canyonland terrain within the Grand Canyon. Detections of MSO indicate they are utilizing small stringers of Douglas-fir trees below the rim (D. Spotskey, NPS, pers. comm., 23 May 2000). No MSO are known from the plateau areas of the Park.

The Park falls within the Colorado Plateau Recovery Unit. The Mexican Spotted Owl Recovery Plan (USFWS 1995) provides for three levels of habitat management: protected areas, restricted areas, and other forest and woodland types. Provisional Protected Activity Centers (PACs) have been designated for known MSO locations in the Park as of 2001. Protected habitat in the Colorado Plateau Recovery Unit includes any PACs, designated wilderness areas, and any mixed conifer forests on slopes over 40%. Restricted habitat in the Colorado Plateau Recovery Unit includes mixed conifer forests or riparian habitats that have primary constituent elements. Primary constituent elements in these habitat types include high basal area of trees, uneven-aged structure, and high snag basal area. Primary constituent elements in canyon habitat include cooler and more humid conditions than in the surrounding area; clumps or stringers of trees; canyon walls with crevices, ledges or caves; high percent cover of ground litter or woody debris; and riparian or woody vegetation.

Spotted owls have been detected below the rim in Transept Canyon, west of the project area. The PAC boundary is greater than 0.8 km (0.5 mile) from the project area. The proposed site for the emergency services/wildland fire facility is within ponderosa pine forest with slight white fir encroachment and qualifies as mixed conifer forest, and therefore restricted habitat, under the Recovery Plan. The site is also within 150 m (492 feet) of the rim, and suitable habitat for MSO exists below the rim. Therefore, this site is considered critical habitat. Because of this critical habitat designation, formal consultation with USFWS has been initiated. The generator and administrative sites and the helibase and exposed frame cabin areas are vegetated by ponderosa pine forest and do not qualify as restricted or critical habitat.

Environmental Consequences

Alternative A – No Action
Direct/Indirect Effects. The construction of existing developments within the Bright Angel Peninsula subwatershed has affected approximately 95 ha (234 acres) of montane conifer forest that is potential foraging habitat for the spotted owl. Ongoing activities at the North Rim create daily disturbance from mid-May to mid-October. Fewer people visit the North Rim during the remainder of the year, when park facilities are closed and snow often obstructs the road. This disturbance has decreased the quality of habitat in and around the North Rim developed area for MSO and would continue under the No-Action Alternative. These local, adverse, long-term impacts are negligible because no roosting or nesting habitat is present on the North Rim and the amount foraging habitat affected is negligible compared to the amount of available habitat. No vegetation manipulation or construction activities are proposed under Alternative A, and no new sources of disturbance would be introduced. Alternative A would therefore have no additional effects on MSO.

Effects Common to All Action Alternatives
Direct/Indirect Effects. Any of the action alternatives would result in modification of approximately 0.8 ha (2.0 acres) of potential foraging habitat for MSO. No vegetation manipulation would occur below the rim and no activities related to increasing visitor use of the area below the rim are proposed. Therefore, the action alternatives would not result in any impacts to nesting or roosting habitat. Foraging habitat that would be affected is of marginal quality because of high disturbance levels from existing developments, roads, and human use. In addition, relative to the amount of available foraging habitat, the amount lost would be negligible. The loss of foraging habitat could result in a limited amount of prey base mortality. Woodrats, mice, and voles could be killed during excavation activities. However, the majority of prey utilizing the habitat proposed for removal would be displaced to adjacent habitat and not killed. In addition, the change in prey base would be negligible because only a small area would be affected relative to available habitat for prey species. Preservation treatments of the exposed frame cabins and

replacement of the helibase support facility would not result in the removal of any habitat. Spotted owls are unlikely to be affected by noise associated with construction activities at the emergency services/wildland fire facility, the exposed frame cabins, or the helibase support facility because the nearest known PAC is more than 0.8 km (0.5 mile) from the project site. Therefore, any action alternative would have a negligible, local, long-term, adverse impact to MSO.

Alternative B – Preferred Alternative
Direct/Indirect Effects. Alternative B would result in the modification of approximately 0.8 ha (2.0 acres) of ponderosa pine/white fir forest. This area is considered critical habitat for the Mexican spotted owl, although all known nesting and roosting habitat at the North Rim occurs below the rim and the closest Protected Activity Center is more than 0.8 km (0.5 mile) from the project site. Modification of ponderosa pine/white fir forest constitutes a minor, adverse, site-specific, long-term effect to critical habitat.

Alternative C and Alternative D
Direct/Indirect Effects. Alternatives C and D would result in the removal of approximately 0.8 ha (2.0 acres) of ponderosa pine forest. This habitat type is not considered critical habitat for MSO and these alternatives would have no effects on critical habitat.

Cumulative Impacts
Ongoing activities at the North Rim create year-round disturbance in the vicinity. Past and present development has affected approximately 95 ha (234 acres) of potential foraging habitat for MSO in the Bright Angel Peninsula sub-unit. This habitat alteration is unlikely to affect spotted owls because MSO are not known to use areas on the plateau. The Outlet Fire affected approximately 1,526 ha (3,772 acres) of potential foraging habitat within the Bright Angel Peninsula subwatershed. The intensity of the fire varied, and the rate of vegetation recovery within the fire perimeter also varies. Because burned areas will recover, the effect of the fire is not considered a net loss of habitat. Prescribed burning has been conducted on 892 ha (2,203 acres) within the watershed sub-unit since 1997 and is planned for 607 ha (1,500 acres) in the next 5 years. Prescribed fires are unlikely to affect MSO because none of these prescribed burn areas are in habitat known to be used by spotted owls, and low-intensity fires are not known to affect spotted owl presence or reproduction (Jenness 2000). No future activities are planned within the Park that would modify spotted owl critical habitat. Foreseeable future developments in the vicinity of the North Rim could modify approximately 6.9 ha (17 acres) of potential foraging habitat and result in increased disturbance during construction. However, this additional modification of foraging habitat is unlikely to affect the spotted owl because foraging habitat in affected areas is of marginal quality as the result of the high level of existing development, roads, and human use. Any disturbances to MSO from noise associated with construction activities for this project or any foreseeable future projects would be minimized by mitigation measures such as those specified earlier in this document. The cumulative effects of any action alternative, in combination with other past, present, and reasonably foreseeable future actions, on spotted owls in the Bright Angel Peninsula sub-unit would be negligible to minor, adverse, local, and long-term.

Conclusion
The No-Action Alternative would not result in any additional disturbance to Mexican spotted owls or removal of potential foraging habitat. Alternative B would result in the modification of approximately 0.8 ha (2.0 acres) of critical habitat for the Mexican spotted owl. Although the site qualifies as critical habitat under the Recovery Plan, it is unlikely to be used by MSO, which are not known to use areas on the plateau. This alternative would result in a may affect, likely to adversely affect determination for MSO. Consultation with USFWS on this determination is in progress. Alternatives C and D would result in the modification of approximately 0.8 ha (2.0 acres) of potential foraging habitat for MSO. These effects would be negligible, local, adverse, and long-term. Alternative C or D may affect, but is unlikely

to adversely affect, the Mexican spotted owl. Cumulative impacts to MSO under any alternative would be negligible to minor, adverse, local, and long-term.

California Condor

Affected Environment

The California condor (*Gymnogyps californianus*) was listed as an endangered species in March 1967. In 1996, the USFWS established a nonessential, experimental population of California condors in northern Arizona. In December 1996 the first condors were released in the Vermillion Cliffs area of Coconino County, Arizona, approximately 48 km (30 miles) north of Grand Canyon National Park. Subsequent releases have occurred in May 1997, November 1997, November 1998, December 1999, and February, September, and December 2002 in the same vicinity and in the Hurricane Cliff area, which is about 96 km (60 miles) west of Vermillion Cliffs. By declaring the population "nonessential, experimental", the USFWS can treat this population as "threatened" and develop regulations for management of the population that are less restrictive than mandatory prohibitions covering endangered species. This facilitates efforts to return the condor to the wild by providing increased opportunities to minimize conflict between the management of the condors and other activities. Within Grand Canyon National Park, the condor has the full protection of a threatened species (NPS 1991).

The population of free-flying condors in Arizona totaled 33 as of December 2002. All of the California condors in northern Arizona are fitted with radio transmitters that allow field biologists to monitor the condors' movements. Condors have been observed as far west as the Virgin Mountains near Mesquite, Nevada; south to the San Francisco Peaks outside of Flagstaff, Arizona; north to Zion and Bryce Canyon National Parks and beyond to Minersville, Utah; and east to Mesa Verde, Colorado and the Four Corners region (Peregrine Fund 2000). Monitoring data indicate condors are using habitat throughout Grand Canyon National Park, with concentration areas in Marble Canyon, Desert View to the Village on the South Rim, and the Village to Hermits Rest.

Nesting habitat for California condors includes various types of rock formations such as crevices, overhung ledges, and potholes. Potential nesting habitat exists throughout the Park. One nesting attempt was documented in the Marble Canyon area in 2001. Two nest sites on the South Rim, one on The Battleship and one on Dana Butte, were initiated in 2002. Both nest sites failed. It is unclear whether condors would select nesting areas in close proximity to developed portions of the Park.

Most California condor foraging occurs in open terrain. Typical foraging behavior includes long-distance reconnaissance flights, lengthy circling flights over a carcass, and hours of waiting at a roost or on the ground near a carcass. Roost sites include cliffs and tall trees, including snags (61 FR 54043-54060).

Environmental Consequences

Alternative A – No Action
Direct/Indirect Effects. Existing developments at the North Rim create year-round human presence in the vicinity. Human presence creates the possibility for condor/human interactions. Condors are monitored daily via radio telemetry, and any condors that land in the developed area at the North Rim would be hazed by permitted Park employees to ensure condors do not become habituated to humans. Current Park policies and activities would be continued under Alternative A, and adverse impacts to condors would be negligible, long-term, and local. No vegetation manipulation or construction activities are proposed under Alternative A. No California condor habitat would be impacted, and no new sources of disturbance

would be introduced with this alternative. Therefore, the No-Action Alternative would have no additional effects on California condors.

Effects Common to All Action Alternatives
Direct/Indirect Effects. The action alternatives would not result in any impacts to nesting or roosting habitat for the California condor because all such habitat occurs below the rim. No vegetation manipulation would occur below the rim, and no activities related to increasing visitor use of the area below the rim are proposed. Foraging habitat would not be affected because these alternatives would not change the availability of food sources for condors.

The action alternatives could affect California condors through increased contact with humans during construction. Condors may be attracted by construction activities, and condor contact with humans would be of concern if the birds are harassed or become habituated to humans. Mitigation measures to cease construction activities if condors are present would reduce disturbance from construction activities on the birds. Hazing by permitted Park employees would ensure condors do not become habituated to humans. Because all activities proposed under the action alternatives would occur in areas of the North Rim that are already developed, use of the emergency services/wildland fire facility, exposed frame cabins, and helibase support facility should not have any long-term effects on the potential for interactions between condors and humans. A condor deterrent device would be installed on the helibase support facility to discourage condor presence. Therefore, adverse impacts to condors would be short-term, local, and negligible.

Cumulative Impacts
Ongoing activities at the North Rim create year-round disturbance in the vicinity and provide the potential for condor/human interactions. Foreseeable future developments at the North Rim would be primarily contained to existing developed areas and would not increase the long-term likelihood of condor/human interactions. Construction activities associated with the action alternatives and any future developments may attract condors. Mitigation measures, such as those included in this document, would reduce the potential for detrimental interactions between condors and humans for any of the action alternatives as well as any foreseeable future actions. The cumulative effects of any action alternative, in combination with other past, present, and reasonably foreseeable future actions, on condors would be negligible, short- and long-term, local, and adverse.

Conclusion
The No-Action Alternative would have no effects on California condors. Any of the action alternatives could have adverse, negligible, local, short-term impacts to condors. Any alternative may affect, but is unlikely to adversely affect, the California condor. Cumulative adverse impacts under any alternative would be negligible, short- and long-term, and local.

Northern Goshawk

Affected Environment

The northern goshawk is holarctic in distribution, occupying boreal and temperate forests of North America, Europe, and Asia (63 FR 35183-35184). It is the largest of the three *Accipiter* species present in North America. There is considerable debate regarding North American subspecies of the northern goshawk. *A. g. atricapillus* is recognized worldwide as occurring over much of Alaska, Canada, and forested regions of the western and eastern United States. Two other subspecies are variously recognized: *A. g. laingi*, which occurs on islands off the Canadian Pacific Coast; and *A. g. apache*, which occurs in

mountains of the southwestern United States. The USFWS does not currently recognize the *apache* subspecies (63 FR 35183-35184).

In Arizona, the northern goshawk is found in coniferous forests in northern, north-central, and eastern Arizona (AGFD 1996). It is also found in pine-oak habitats in isolated mountain ranges in southeastern Arizona. Approximately 250 breeding pairs were known in 1996, half of which occurred on the North Kaibab Ranger District in northern Arizona. Goshawks in montane areas may winter on or near their home ranges or descend to lower elevations into woodlands, riparian areas, or scrublands (Reynolds et al. 1992).

Northern goshawks generally nest in stands of mature trees with a dense canopy. In the Southwest, goshawks most frequently occupy three forest types: ponderosa pine; mixed species (primarily Douglas fir and white fir); and Englemann spruce–subalpine fir (*Abies lasiocarpa*). Nest sites are typically located on northerly slopes (Reynolds et al. 1992).

Although goshawks typically nest in stands of mature trees, they are forest generalists and use a variety of forest ages and types to meet their life history requirements (Reynolds et al. 1992, 63 FR 35183-35184). Various studies have shown that the mean size of a goshawk home range is around 2,023 ha (5,000 acres) (Reynolds et al. 1992), and these home ranges generally contain a mosaic of forest conditions. Goshawks prey opportunistically on a variety of small to mid-sized mammalian and avian species such as squirrels (Sciuridae), blue grouse (*Dendragapus obscurus*), rabbits, woodrats, doves (*Zenaida* spp.), jays (*Cyanocitta* spp.), and woodpeckers (*Picoides* spp.). Foraging habitat is probably as closely related to prey availability as to habitat structure or composition. Many prey species use snags, downed logs, woody debris, large trees, openings, and herbaceous and woody understories. Because goshawks are visually limited in habitats with dense understories, an open understory enhances detection and capture of prey (Reynolds et al. 1992).

Goshawk surveys have been conducted in Grand Canyon National Park. South Rim surveys were conducted regularly in 1991, 1992, and 1994-1996. Sporadic surveys also occurred in 1999 and 2000, and several nests were found. Surveys have also occurred on the North Rim, most recently in 2002 in areas affected by the Outlet Fire. The primary habitat for goshawks within the Park is in the mixed conifer and ponderosa pine habitat on the North Rim. There are approximately 10 known goshawk territories in the vicinity of the North Rim developed area, 2 of which are within the Bright Angel Peninsula subwatershed. This is a small proportion of the over 100 territories on the North Kaibab plateau. The nearest known goshawk territory is approximately 1.6 km (1 mile) from the project area.

Environmental Consequences

Alternative A – No Action
Direct/Indirect Effects. Existing developments on and near the Bright Angel Peninsula have resulted in the removal or modification of approximately 95 ha (234 acres) of potential nesting and foraging habitat for the northern goshawk. Human activity at the North Rim, particularly on the Bright Angel Peninsula from mid-May to mid-October, also reduces the suitability of the area for nesting and foraging by goshawks. Existing development and human activity could have adverse, local, long-term, minor impacts on northern goshawks. No additional habitat would be modified under the No-Action Alternative, and this alternative would not have any additional effects on northern goshawks.

Effects Common to All Action Alternatives
Direct/Indirect Effects. All action alternatives would result in the removal or modification of approximately 0.8 ha (2.0 acres) of potential goshawk nesting and foraging habitat for construction of the

emergency services/wildland fire facility. The habitat that would be modified is of low quality because existing development has fragmented the habitat and resulted in human disturbance in the area throughout the goshawk breeding season. Preservation treatments of the exposed frame cabins and construction of the helibase support facility would not result in habitat removal but could result in increased noise disturbance during construction. This additional disturbance would be negligible because these facilities are in an area that currently receives daily human disturbance during the breeding season. Therefore, the effects of any of the action alternatives would be adverse, local, negligible, and both long- and short-term.

Cumulative Impacts

Past and present development has altered approximately 95 ha (234 acres) of goshawk nesting and foraging habitat in the Bright Angel Peninsula sub-unit and has created year-round human disturbance in the area. The area affected is minor compared to the amount of available montane conifer habitat in the vicinity. The Outlet Fire affected approximately 1,526 ha (3,772 acres) of potential foraging and nesting habitat within the Bright Angel Peninsula subwatershed. The intensity of the fire varied, and the rate of vegetation recovery within the fire perimeter also varies. Because burned areas will recover, the effect of the fire is not considered a net loss of habitat. Burned areas also support prey species of the goshawk such as woodpeckers. Prescribed burning has been conducted on 892 ha (2,203 acres) within the watershed sub-unit since 1997 and is planned for 607 ha (1,500 acres) in the next 5 years. Low-intensity burns are recommended in ponderosa pine and mixed conifer vegetation types to provide habitat for prey species and to reduce the incidence of catastrophic fire (Reynolds et al. 1992). Prescribed burns, therefore, may have minor, local, beneficial effects on northern goshawks. Foreseeable future developments in the vicinity of the North Rim could modify approximately 6.9 ha (17 acres) of potential foraging habitat and result in increased noise disturbance during construction. This additional modification of habitat is unlikely to affect the northern goshawk because habitat in affected areas is of marginal quality as the result of the high level of existing development, roads, and human use. The cumulative effects of any action alternative, in combination with other past, present, and reasonably foreseeable future actions, on northern goshawks in the Bright Angel Peninsula sub-unit would be minor, adverse, local, and short- and long-term.

Conclusion

The No-Action Alternative would have no direct effects on northern goshawks. Any of the action alternatives would result in the modification of approximately 0.8 ha (2.0 acres) of potential nesting and foraging habitat. The action alternatives would also result in additional disturbance during construction. These effects would be adverse, local, negligible, and both long- and short-term. The action alternatives may impact individual northern goshawks but are not likely to result in a trend toward federal listing or a loss of population viability. Cumulative impacts would be minor, adverse, short- and long-term, and local.

American Peregrine Falcon

Affected Environment

The American peregrine falcon (*Falco peregrinus anatum*) was listed as endangered in 1970. On 25 August 1999, the USFWS removed the peregrine falcon from the federal list of endangered and threatened wildlife due to its recovery. The principal cause of the peregrine's decline was chlorinated pesticides, especially DDT and its metabolite DDE, which accumulated in peregrines as a result of feeding on contaminated prey. This interfered with calcium metabolism and caused a decline in reproductive success as the result of thin eggshells.

The population of peregrine falcons in Arizona is steadily increasing. In 1991, the peregrine falcon population in the Rocky Mountain/Southwest region was 367 known pairs; in 1998, the number of pairs had increased to 535. In Arizona, the known number of peregrine falcon pairs was 159 in 1999 (64 FR 46542-46558).

Peregrine falcons generally nest on cliffs near water. However, river cutbanks, trees, and manmade structures have been used as nesting habitat (USFWS 2000). Peregrine falcons feed primarily on other birds such as songbirds, shorebirds, and waterfowl. The usual method of obtaining prey is by attacking flying birds from above or chasing them from behind.

No peregrine eyries are known from the Bright Angel Peninsula. The nearest known eyrie is within Grand Canyon more than 0.8 km (0.5 mile) from the peninsula.

Environmental Consequences

Alternative A – No Action
Direct/Indirect Effects. The construction of existing developments on and near the Bright Angel Peninsula has affected approximately 95 ha (234 acres) of potential habitat for peregrine prey. This local, adverse, long-term impact is negligible because the amount of habitat affected is negligible compared the amount of available habitat. Noise from year-round activities at the North Rim is unlikely to affect peregrines because no eyries are known from within 0.8 km (0.5 mile) of the developments. Therefore, impacts of the continuation of current Park policies on peregrine falcons would be adverse, negligible, local, and long-term. No construction or preservation treatments would take place under Alternative A, and this alternative would have no additional effects on peregrine falcons.

Effects Common to All Action Alternatives
Direct/Indirect Effects. No peregrines are known to nest within 0.8 km (0.5 mile) of the project area, and no direct effects on peregrine falcons are expected under any of the action alternatives. The action alternatives would remove or modify approximately 0.8 ha (2.0 acres) of potential habitat for peregrine falcon prey. However, this loss of habitat would be unlikely to affect peregrine falcons because the change in prey base would be negligible given the small area being affected relative to the available potential habitat for the prey base. The majority of the prey base utilizing the habitat proposed for removal would be displaced to adjacent habitat. Indirect adverse effects on peregrine falcons under any action alternative would be negligible, long-term, and local.

Cumulative Impacts
The Outlet Fire affected approximately 1,526 ha (3,772 acres) of potential habitat for peregrine prey within the Bright Angel Peninsula subwatershed. The intensity of the fire varied, and the rate of vegetation recovery within the fire perimeter also varies. Because burned areas support potential peregrine prey and because these areas will recover, the effect of the fire is not considered a net loss of habitat. Prescribed burning has been conducted on 892 ha (2,203 acres) within the watershed sub-unit since 1997 and is planned for 607 ha (1,500 acres) in the next 5 years. Prescribed fires are generally of small size and low intensity and would not be expected to have measurable effects on the availability of peregrine prey species. In addition to the approximately 95 ha (234 acres) of potential peregrine foraging habitat that have been affected by past development, 6.9 ha (17 acres) of potential foraging habitat would be affected at the North Rim by foreseeable future developments. None of the foreseeable future developments would affect nesting habitat below the rim or increase use of the area below the rim. The majority of the developments would occur in existing disturbed areas and would not measurably change prey base populations. Cumulative adverse impacts of any action alternative, in combination with past, present, and reasonably foreseeable future actions, would therefore be negligible, local, and long-term.

Conclusion
The No-Action Alternative would have no effects on peregrine falcons. Impacts of any of the action alternatives on peregrine falcons would be negligible, adverse, local, and long-term. Adverse cumulative impacts would also be negligible, local, and long-term. Any of the action alternatives may affect individual peregrine falcons but is not likely to result in a trend toward federal listing or a loss of population viability.

Kaibab Squirrel

Affected Environment

Tassle-eared (Abert) squirrels (*Sciurus aberti*) are found in ponderosa pine communities in parts of Wyoming, Colorado, New Mexico, Arizona, and Utah in the United States and in the Sierra Madre Occidental from Sonora and Chihuahua south to Durango in Mexico (Nash and Seaman 1977). Three subspecies are recognized in Arizona: *S. a. kaibabensis* (Kaibab squirrel) on the Kaibab Plateau, *S. a. chuscensis* in northeastern Arizona, and *S. a. aberti* south of the Colorado and Little Colorado Rivers. All subspecies in Arizona are restricted to ponderosa pine forests. Nests are typically built of small pine branches in a large pine tree. Nest trees are usually in closed stands and have a crown interlocked with those of several neighboring trees (Halloran and Bekoff 1994). The best habitat for Abert squirrels may be intermediate-aged forest interspersed with groups of large trees with interlocking crowns. Abert squirrels consume the seeds, inner bark, terminal buds, and staminate flowers of ponderosa pines (Nash and Seaman 1977). They also feed on fungi, mistletoe, antlers, acorns, and insects (Hoffmeister 1986). Abert squirrels are opportunistic feeders, consuming foods that are readily accessible. During the winter, the inner bark and terminal buds of ponderosa pines are the primary food source. Populations of Abert squirrels may fluctuate widely over space and time, possibly in response to variations in the seed production of pine trees (Mejia 1997).

The Kaibab squirrel was historically found only on the North Rim of the Grand Canyon. In the 1940s, transplants of Abert squirrels occurred in mountain ranges throughout south and central Arizona. Between 1972 and 1977, Kaibab squirrels were transplanted from the Kaibab Plateau to Mt. Logan on the Arizona Strip. Kaibab squirrels now occur in the Sawmill Mountains, on Mt. Emma, and on Mt. Trumbull, in addition to the Kaibab Plateau. Kaibab squirrels on the Kaibab Plateau have been designated a National Natural Landmark. This designation comes with direction to federal agencies to consider the unique properties of Natural Landmarks when assessing effects of actions on the environment. The Bright Angel Peninsula is within the National Natural Landmark boundary for the Kaibab squirrel.

Environmental Consequences

Alternative A – No Action
Direct/Indirect Effects. Existing developments on the Bright Angel Peninsula have resulted in the removal or modification of approximately 38 ha (93 acres) of ponderosa pine habitat. Although ponderosa pine habitat is widespread on the North Rim and the Kaibab Plateau, the developed area on the Bright Angel Peninsula contains the only ponderosa pine habitat in the Bright Angel Peninsula subwatershed. This loss of habitat thus constitutes a minor to moderate, local, adverse, long-term effect to Kaibab squirrels and the National Natural Landmark. No additional habitat would be modified under the No-Action Alternative, and this alternative would not have any additional effects on Kaibab squirrels.

Alternative B – Preferred Alternative

Direct/Indirect Effects. The preferred alternative would result in the removal of approximately 65-85 ponderosa pine trees > 30.5 cm (12 inches) dbh that could provide foraging, nesting, and sheltering sites at the proposed location for the emergency services/wildland fire facility. Construction activities could result in direct mortality of individuals but are more likely to cause displacement of Kaibab squirrels to adjacent habitat. Because the area that would be disturbed is in an area already disturbed by existing developments and activities, the preferred alternative would have minor, local, long-term, adverse effects on Kaibab squirrels.

Alternative C and Alternative D

These action alternatives would result in the removal of 20-40 ponderosa pine trees > 30.5 cm (12 inches) dbh that could provide foraging, nesting, and sheltering sites for Kaibab squirrels at the generator and administrative sites for the emergency services/wildland fire facility. Construction activities could result in direct mortality of individuals but are more likely to cause displacement of Kaibab squirrels to adjacent habitat. Because few trees would be removed and the area that would be disturbed is in an area already disturbed by existing development and activity, these alternatives would have negligible, local, long-term, adverse effects on Kaibab squirrels.

Cumulative Impacts

The cumulative impact area for Kaibab squirrels was defined as ponderosa pine areas within the Bright Angel Peninsula subwatershed. In addition to the 38 ha (93 acres) of ponderosa pine habitat that have been affected by past and present developments at the North Rim, approximately 35-55 ponderosa pine > 30.5 cm (12 inches) dbh could be removed by foreseeable future actions on approximately 1.6 ha (4.0 acres). Any foreseeable future actions would occur in close proximity to previously disturbed areas. Cumulative effects of any action alternative, along with other past, present, or reasonably foreseeable future actions on Kaibab squirrels would be minor to moderate, adverse, long-term, and local.

Conclusion

The No-Action Alternative would not result in any direct effects on Kaibab squirrels or their habitat. Alternative B could have minor, local, long-term, adverse effects on Kaibab squirrels while Alternative C or D would have negligible, local, long-term, adverse effects. The action alternatives may impact individual Kaibab squirrels but are not likely to result in a trend toward federal listing or a loss of population viability. Cumulative impacts on Kaibab squirrels would be minor to moderate, adverse, long-term, and local.

Impairment

None of the alternatives would have a major, adverse impact to any special status species. Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the Park or to opportunities for enjoyment of the Park; or (3) identified as a goal in the Park's general management plan or other relevant NPS planning documents, there would be no impairment of the Park's resources or values.

CULTURAL RESOURCES

Affected Environment

Cultural History Overview

Prehistory
Recent archaeological evidence has placed the earliest known cultural activity in the Grand Canyon area to about 8500 B.C. This coincides with the Late Paleo-Indian period (ca. 9000-7000 B.C.), characterized by small groups of nomadic hunters who subsisted primarily on large Pleistocene mammals ("mega-fauna"). The Archaic period (ca. 7000-500 B.C.) followed with highly mobile groups of hunters and gatherers dispersed over wide geographic areas. Archaic period sites found throughout the Canyon typically consist of lithic scatters, camp sites, chip stone reduction areas, limited activity areas, rock art panels, caves, and rock shelters (NPS 2001e:17).

Between ca. 500 B.C. and A.D. 1540, ancestral Puebloan people settled along the inner Canyon and on the North and South Rims. Cultural remains identified from the Basketmaker II & III periods (while rare in the Grand Canyon area) are indicative of semi-mobile hunting and gathering subsistence strategies. Hearths, limited activity areas, and pithouses with dispersed artifact scatters have been identified from these periods. Archaeological evidence indicates the emergence of a more sedentary and agriculturally centered culture during the later Pueblo I period (ca. A.D. 800-1000) and Pueblo II period (ca. A.D. 1000-1150). Among the archaeological resources identified with these later periods are pithouses, aboveground masonry structures (for habitation and grain storage), kivas, and agricultural features (terraces, garden plots, and check dams). Most of the Puebloan people abandoned the Canyon sometime after A.D. 1170, with only remnant populations remaining (NPS 2001e:17).

Cohonina people were also present in the Grand Canyon at approximately the same time as their Puebloan neighbors. Although archaeological information regarding Cohonina activities in the Canyon is currently limited, mounting evidence suggests that they possessed a complex culture that involved foraging in the vicinity of the Canyon during the summer season. They wintered near Mt. Sitgreaves, where identified sites include pithouses, masonry room blocks, walled compounds, interior hearths, and storage areas (NPS 2001e:17).

Historic Period.
The Havasupai and Hualapai were among the groups occupying the canyon during protohistoric and historic times (the period between approximately A.D. 1540 and 1950). Up until the late nineteenth century, the Havasupai traditionally spent their winters on the plateau of the South Rim, relocating below the rim to Cataract (Havasu) Canyon during the spring and summer months to grow crops. Historical accounts document ancestral Navajo interactions with the Havasupai during the 1600s. By the mid nineteenth century, the Navajo made extensive use of Canyon resources for subsistence and religious purposes and continued to graze sheep, goats, and horses in the vicinity into the 1930s and 1940s. The Hopi, Southern Paiute, and Zuni have also at various times either occupied the Grand Canyon, procured and utilized canyon resources, and/or traded with the Havasupai and other groups (NPS 2001e:17).

The first historic Euro-American contact with the Grand Canyon and its indigenous Puebloan people began between 1540 and 1542 with the Spanish expedition led by Francisco Vásquez de Coronado. The Canyon was initially considered an impassable barrier, and the Spaniards did not revisit it for another 200 years. During the nineteenth century, trappers and United States surveyors and military expeditions passed through the area. Some sheep ranching and mining took place in the latter part of the century. However, more economically viable ranching, tourism, and lumbering operations emerged around the

beginning of the twentieth century, facilitated by completion of rail transportation to the South Rim in 1901. Environmental degradation from overgrazing and lumbering led to the establishment of the Grand Canyon Forest Reserve in 1893. Efforts to provide further protection eventually resulted in the establishment of Grand Canyon National Park in 1919 (NPS 2001e:17-18).

Tourist development on the North Rim began in 1916 when William W. Wylie, a well-known concessionaire in Yellowstone National Park, established a camp (composed of sleeping tents and a main dining tent) above the head of Transept Canyon near the tip of Bright Angel Point. Due to the severity of winters on the North Rim, however, the camp was operated only during the summer months. In 1924 Wylie's daughter Elizabeth and her husband Thomas McKee took over operation of the camp. Within three years the McKees had added 38 wood-roofed cabins, 16 tent-roofed cabins, sheds, a main pavilion, and a Kohler light plant to the camp (Chappell 1982a).

While Wylie and the McKees were developing their tourist camp on the North Rim, the National Park Service approached the Union Pacific Railroad with a proposal for the company to help develop the North Rim, as well as Zion and Bryce Canyon National Parks, for tourism. In 1923 the Utah Parks Company, a wholly owned subsidiary of the Union Pacific, was incorporated and charged with managing tourism interests in the area. The Utah Parks Company soon bought out the concessions at Zion, Bryce, and the Mckee camp at the North Rim of the Grand Canyon. The Company then hired Architect Gibert Stanley Underwood to design a deluxe lodge near the tip of Bright Angel Point and to replace the Wylie/McKee camp with a number of deluxe and economy cabins (Chappell 1982a). The new lodge was completed in 1928 but burned four years later. In 1936-37, the Grand Canyon Lodge was rebuilt using most of what remained of the original lodge (Harrison 1986).

The Utah Parks Company also erected a number of visitor facilities near the central part of Bright Angel Peninsula, north of the lodge area. These facilities include an Inn, a group of exposed frame cabins, and a group of log cabins identical to the economy cabins at the lodge. Adjacent to this development on the south, the Park Service established a campground with restrooms and an amphitheater (Chappell 1982a). In addition to the campground, the NPS built the headquarters for the North Rim. Located north of the Inn and campground area, the headquarters contained Park employee housing and administrative and maintenance facilities (Chappell 1982b).

National Historic Districts

The North Rim contains three National Historic Districts: The Grand Canyon Lodge National Historic Landmark District, the North Rim Inn and Campground Historic District, and the North Rim Headquarters Historic District (Figure 9). Of the three districts, only the North Rim Inn and Campground Historic District and the North Rim Headquarters Historic District could potentially be affected by project undertakings; the Grand Canyon Lodge National Historic Landmark District is south of all action alternatives and would not be affected by the proposed development. Therefore, the following discussion does not include the Grand Canyon Lodge National Historic Landmark District.

The North Rim Inn and Campground Historic District was listed on the National Register of Historic Places in 1982 (Chappell 1982a). The district includes the North Rim Inn; 26 exposed frame cabins (originally there were 27 but one was demolished); 10 duplex log cabins; a linen house; a shower/bath building; a laundry building; and the campground with its outdoor fireplaces, stone enclosures for firewood, restrooms, shower facilities, and amphitheater for interpretive programs.

The North Rim Headquarters Historic District was listed on the National Register of Historic Places in 1982 (Chappell 1982b). The headquarters area consists of two groupings of buildings. The eastern

grouping consists of several residences, a garage, and an administrative building. The western grouping includes maintenance buildings, an administrative building, a barn, and more residences. Most of the buildings were constructed in the late 1920s and early 1930s (Chappell 1982b).

Cultural Landscape Resources

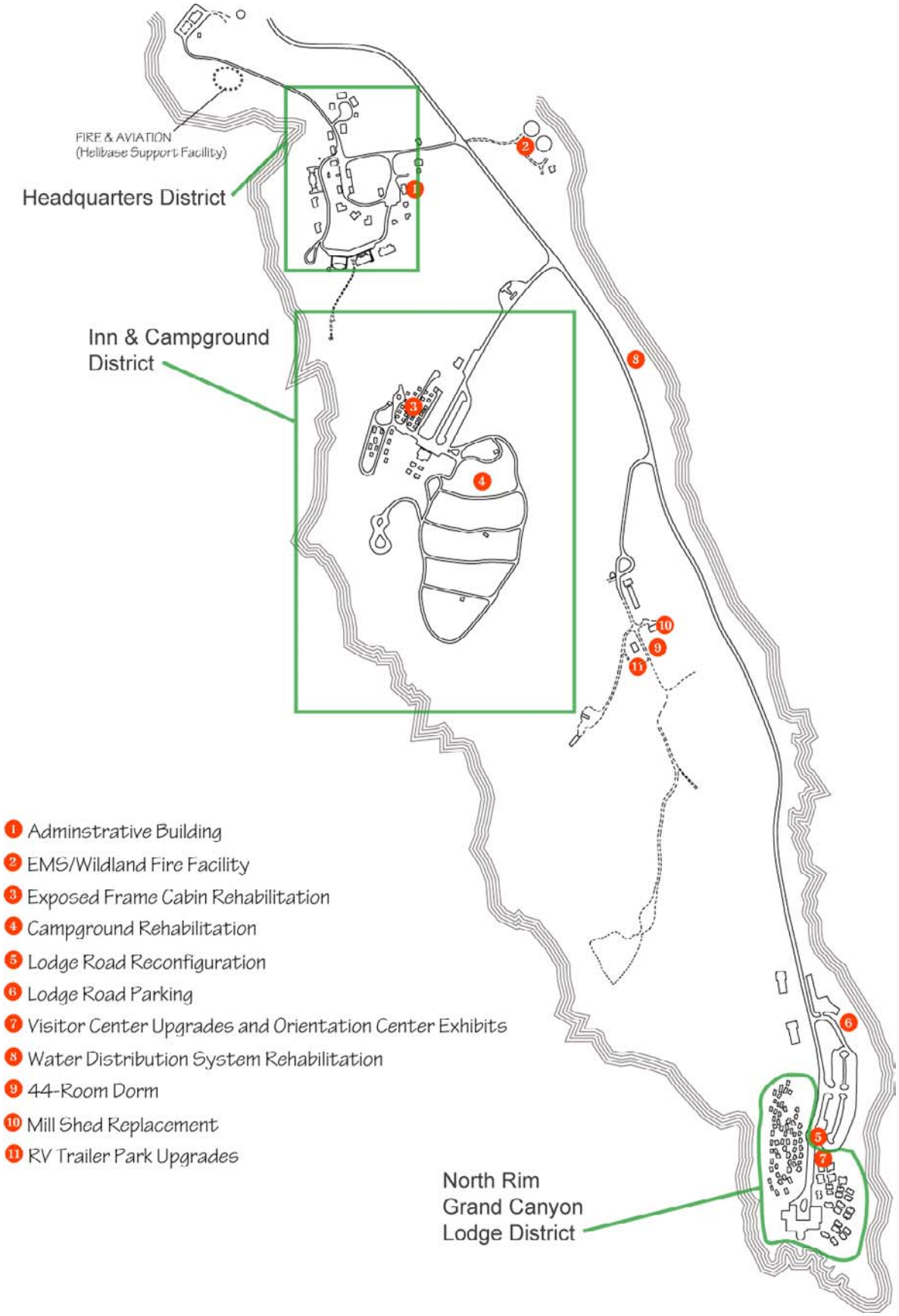
The *Cultural Landscapes Inventory Professional Procedures Guide* prepared by the NPS defines cultural landscapes as:

> . . . settings that human beings have created in the natural world. They reveal fundamental ties between people and land—ties based on our need to grow food, give form to our settlements, meet requirements for recreation, and find suitable places to bury our dead. Cultural landscapes are intertwined patterns of things both natural and constructed—plants and fences, watercourses, and buildings. They range from formal gardens to cattle ranches, from cemeteries and pilgrimage routes to village squares. They are special places—expressions of human manipulation and adaptation of the land (Page 2001:1).

A Cultural Landscape Report (CLR) is currently being prepared for the North Rim Bright Angel Peninsula Developed Area (OCULUS 2002). The purposes of the CLR are to identify, document, analyze, and evaluate contributing and non-contributing cultural landscape characteristics within the cultural landscape and to provide specific recommendations and comprehensive vision for the landscape that can guide long-term management. Once completed, the CLR will serve as a supporting document for implementation of the GMP.

Although still in draft form, the North Rim Bright Angel Peninsula Developed Area CLR (OCULUS 2002) provides a general recommendation treatment approach relevant to the rehabilitation,

Figure 9. Historic districts on the North Rim and foreseeable future projects.



reconstruction, and restoration of Building Nos. 1-8 and 10-27, the shower facility, and the laundry facility proposed under the action alternatives:

> Because rehabilitation is defined as 'the act or process of making possible a compatible use for a property through repair, alterations, and additions, while preserving those portions or features which convey its historical, cultural or architectural values,' **rehabilitation** is the primary overall recommended approach to resource management. Rehabilitation will allow for the establishment of a rich and fulfilling visitor experience, and the implementation of necessary functional site improvements. Rehabilitation will also allow the park to pursue resource management initiatives that are intended to promote sustainability (OCULUS 2002:V-4).

Furthermore, the draft CLR provides specific recommendations for the location of the emergency services/wildland fire facility identified under the preferred alternative (Alternative B). The CLR states that the site proposed under Alternative B is not a major contributor to the significance of the study area and that the site is preferable to other locations because it is disturbed (OCULUS 2002:V-24). However, the CLR recommends that the site be developed as unobtrusively as possible and as much existing vegetation as possible be retained between the new facility and the entrance road (OCULUS 2002:V-24).

Ethnographic Resources

Ethnographic resources are defined by the NPS as any "site, structure, object, landscape, or natural resource feature assigned traditional, legendary, subsistence, or other significance in the cultural system of a group traditionally associated with it" (Cultural Resource Management Guidelines [DO-28:191]). The lands of Grand Canyon National Park are traditionally affiliated with nine American Indian groups: Havasupai, Hopi, Hualapai, Kaibab Band of Paiute Indians, Navajo, Paiute Indian Tribe of Utah, White Mountain Apache, San Juan Southern Paiute, and Pueblo of Zuni.

The Grand Canyon has long been of importance to native cultures and figures prominently in the origin/religious beliefs and ceremonial practices of many groups. For example, traditional Hopi and Zuni beliefs hold the Grand Canyon as the sacred place from which their ancestors emerged to the present world (NPS 2001e). Although ethnographic resources significant to Native Americans may be present in the vicinity of Bright Angel Peninsula, no ethnographic resources are known to exist within the area proposed for development (NPS 2001f).

Copies of this EA will be forwarded to each affiliated tribe for review and comment. If the tribes subsequently identify the presence of additional ethnographic resources within the project construction area, appropriate mitigation measures would be undertaken in consultation with the tribes. The location of any ethnographic sites would not be made public.

Archaeological Resources

Although the North Rim has some of the most important archeological sites in Grand Canyon National Park, especially in the Walhalla Glades area where surveys have located hundreds of sites (NPS 2001f:21), there are only three known archeological sites on the Bright Angel Peninsula (Euler 1975, NPS 2001f). Archeological surveys conducted on the peninsula over the last 20 years have not identified any additional sites (NPS 2001f). None of the three sites are located in the proposed project areas.

Environmental Consequences

In this environmental assessment/assessment of effect, impacts to cultural resources (archeological resources, historic structures, the cultural landscape, and ethnographic resources) are described in terms of type, context, duration, and intensity, as described above. These impact analyses are intended, however, to comply with the requirements of both NEPA and §106 of the NHPA. In accordance with the Advisory Council on Historic Preservation's regulations implementing §106 of the NHPA (36 CFR Part 800, *Protection of Historic Properties*), impacts to cultural resources were identified and evaluated by (1) determining the area of potential effects; (2) identifying cultural resources present in the area of potential effects that were either listed on or eligible to be listed on the National Register of Historic Places; (3) applying the criteria of adverse effect to affected cultural resources either listed on or eligible to be listed on the National Register; and (4) considering ways to avoid, minimize, or mitigate adverse effects.

Under the Advisory Council's regulations, a determination of either *adverse effect* or *no adverse effect* must also be made for affected cultural resources that are eligible for the National Register. An *adverse effect* occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the National Register, e.g., diminishing the integrity of the resource's location, design, setting, materials, workmanship, feeling, or association. Adverse effects also include reasonably foreseeable effects caused by the preferred alternative that would occur later in time, be farther removed in distance, or be cumulative (36 CFR Part 800.5, *Assessment of Adverse Effects*). A determination of *no adverse effect* means there is an effect, but the effect would not diminish in any way the characteristics of the cultural resource that qualify it for inclusion in the National Register.

CEQ regulations and the National Park Service's *Conservation Planning, Environmental Impact Analysis and Decision-making* (Director's Order #12) also call for a discussion of the appropriateness of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact, e.g., reducing the intensity of an impact from major to moderate or minor. Any resultant reduction in intensity of impact due to mitigation, however, is an estimate of the effectiveness of mitigation under NEPA only. It does not suggest that the level of effect as defined by §106 is similarly reduced. Although adverse effects under §106 may be mitigated, the effect remains adverse.

A §106 summary is included in the impact analysis sections for archeological resources, historic structures and buildings, cultural landscapes, and traditional cultural properties under the action alternatives. The §106 Summary is intended to meet the requirements of §106 and is an assessment of the effect of the undertaking (implementation of the alternative) on cultural resources, based upon the criterion of effect and criteria of adverse effect found in the Advisory Council's regulations.

Archaeological Resources. The definitions for levels of impacts to archaeological resources are as follows:

Negligible impact is barely measurable and has no perceptible consequences, either adverse or beneficial, to archaeological resources. For purposes of §106, the determination of effect would be *no adverse effect*.

Minor Adverse – disturbance of the site(s) is confined to a small area with little, if any, loss of important information. For purposes of §106, the determination of effect would be *no adverse effect*.
Beneficial – a site is preserved in its natural state. For purposes of §106, the determination of effect would be *no adverse effect*.

Moderate Adverse – disturbance of the site(s) results in a substantial loss of important information. For purposes of Section 106, the determination of effect would be *adverse effect*.
Beneficial – Stabilization of the site(s). For purposes of §106, the determination of effect would be *no adverse effect*.

Major Adverse – disturbance of the site(s) is substantial and results in the loss of most or all of the site and its potential to yield important information. For purposes of §106, the determination of effect would be *adverse effect*.
Beneficial – active intervention is undertaken to preserve the site. For purposes of §106, the determination of effect would be *no adverse effect*.

Historic Structures. The definitions for levels of impacts to historic structures or buildings are as follows:

Negligible impact is barely measurable and has no perceptible consequences, either adverse or beneficial, to historic structures. For purposes of §106, the determination of effect would be *no adverse effect*.

Minor Adverse – the character-defining feature(s) of a structure listed on or eligible for the National Register are not affected. For purposes of §106, the determination of effect would be *no adverse effect*.
Beneficial – stabilization/preservation of the character-defining feature(s) in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* to maintain the existing integrity of a structure. For purposes of §106, the determination of effect would be *no adverse effect*.

Moderate Adverse – the character-defining feature(s) of the structure are altered but the integrity of the resource is not affected to the extent that its National Register eligibility is jeopardized. For purposes of §106, the determination of effect would be *adverse effect*.
Beneficial – rehabilitation of a structure in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* to make possible a compatible use of the property while preserving its character-defining features. For purposes of §106, the determination of effect would be *no adverse effect*.

Major Adverse – the character-defining feature(s) of the structure are altered and the integrity of the resource is affected to the extent that its National Register eligibility is jeopardized. For purposes of §106, the determination of effect would be *adverse effect*.
Beneficial – restoration in accordance with the *Secretary of the Interior's Standards for the Treatment of Historic Properties* to accurately depict the form, features, and character of a structure as it appeared during its period of significance. For purposes of §106, the determination of effect would be *no adverse effect*.

Cultural Landscapes. The definitions for levels of impacts to cultural landscapes are as follows:

Negligible impact is barely measurable and has no perceptible consequences, either adverse or beneficial, to cultural landscapes. For purposes of §106, the determination of effect would be *no adverse effect*.

Minor Adverse – the character-defining feature(s) of a cultural landscape listed on or eligible for the National Register is/are not affected. For purposes of §106, the determination of effect would be *no adverse effect*.
Beneficial – character-defining features are preserved in accordance with the Secretary of the Interior's standards to maintain existing integrity of the cultural landscape. For purposes of §106, the determination of effect would be *no adverse effect*.

Moderate Adverse – the character-defining feature(s) of the cultural landscape is/are altered but the integrity of the resource is not affected to the extent that its National Register eligibility is jeopardized. For purposes of §106, the determination of effect would be *adverse effect*.
Beneficial – a landscape or its features are rehabilitated in accordance with the Secretary of the Interior's standards to make possible a compatible use of the landscape while preserving its character-defining features. For purposes of §106, the determination of effect would be *no adverse effect*.

Major Adverse – the character-defining feature(s) of the cultural landscape is/are altered and the integrity of the resource is affected to the extent that its National Register eligibility is jeopardized. For purposes of §106, the determination of effect would be *adverse effect*.
Beneficial – a landscape or its features are restored in accordance with the Secretary of the Interior's standards to accurately depict the landscape as it appeared during its period of significance. For purposes of §106, the determination of effect would be *no adverse effect*.

Alternative A – No Action

Direct/Indirect Effects. The No-Action Alternative would have no direct effect on identified cultural resources on the North Rim. The cultural landscape, including the historic buildings and structures of the North Rim Inn and Campground Historic District and the North Rim Headquarters Historic District, would be protected to the greatest extent possible under existing NPS policies and the availability of Park staff and other support personnel to carry out maintenance. Any archeological and ethnographic resources that may be present in the area would be preserved and protected in situ under this alternative.

The No-Action Alternative has the potential to affect landscape features at the North Rim indirectly. Specifically, deferred maintenance on the 26 one-room cabins (Building Nos.1-8 and 10-27), the shower facility, and the laundry facility within the North Rim Inn and Campground Historic District would continued to exacerbate the rate of wear and deterioration of the historic buildings and may threaten their character-defining qualities. This indirect effect would be minor, adverse, site-specific, and long-term.

Effects Common to All Action Alternatives

Direct/Indirect Effects. No archaeological or ethnographic resources have been identified at the project areas, and no impacts to these resources are expected under any alternative. All action alternatives would result in the restoration, reconstruction, or rehabilitation of the 26 historic exposed frame cabins (Building Nos.1-8 and 10-27), the shower facility, and the laundry facility within the North Rim Inn and Campground Historic District. Preservation efforts would improve the appearance of the buildings while maintaining their historic integrity. This would constitute a moderate, beneficial, site-specific, long-term effect on the historic district and historic cultural landscape. Replacement of the existing facilities at the helibase would have no effect on cultural resources.

Alternative B – Preferred Alternative

Direct/Indirect Effects. Under Alternative B, the emergency services/wildland fire facility would be constructed near the water tanks on the east side of Highway 67. This location is outside of the three historic districts in an area that is not a major contributor to the significance of the historic cultural landscape. Existing vegetation would be retained to make the facility as unobtrusive as possible. The CLR recommends realigning the entrance drive to the proposed emergency services/wildland fire facility to make the facility less visible from Highway 67 (OCULUS 2002). However, realigning the drive would result in a greater loss of vegetation at the site, and the preferred alternative uses the alignment of the existing drive. Because the emergency services/wildland fire facility would be visible to alert visitors, Alternative B would result in a minor, adverse, long-term, site-specific effect to the historic cultural landscape.

Alternative C – Generator Site

Direct/Indirect Effects. Under this alternative, the emergency services/wildland fire facility would be constructed north of the generator building, on the west side of Highway 67. A portion of the facility site would extend into the North Rim Headquarters Historic District, an area that contributes to the significance of the historic cultural landscape. This would constitute a moderate, adverse, long-term, site-specific effect on the historic district and historic cultural landscape.

Alternative D – Administrative Site

Direct/Indirect Effects. Under this alternative, the emergency services/wildland fire facility would be constructed between Highway 67 and the administrative area on the west side of the highway. This area is outside of the North Rim Headquarters Historic District but within visual distance of the district. Consequently, placement of the facility under Alternative D would have an indirect impact on the district and the historic cultural landscape. Therefore, Alternative D would constitute a moderate, adverse, site-specific, long-term effect on the historic district and historic cultural landscape.

Cumulative Impacts

The historic districts and the overall cultural landscape of the Bright Angel Peninsula have sustained previous impacts as the result of modifications to some historic buildings. Modern buildings have also intruded on the historic setting of the cultural landscape. Furthermore, previous deterioration of some buildings as a result of natural weathering and use has compromised defining architectural characteristics. Past development of Park facilities has likely impacted archaeological resources in the area. Loss or disturbance of archaeological sites on the North Rim (in conjunction with previous losses and prevailing threats to finite numbers of archaeological resources throughout the region) incrementally diminishes the overall understanding of Grand Canyon's cultural history. These past impacts are moderate, adverse, local, and long-term. Most of the foreseeable future projects that have the potential to affect cultural resources have been previously discussed with SHPO. Continued consultation with SHPO and use of the treatment recommendations made in the CLR (OCULUS 2002) as the basis for future project planning would ensure that the potential for adverse effects to cultural resources would be minimized. Therefore, adverse cumulative effects of any action alternative, along with past, present, and foreseeable future actions, would be moderate, local, and long-term. Minor to moderate beneficial impacts to individual historic resources would also result from implementing planned future projects designed to rehabilitate or protect historic structures, such as the installation of sprinklers in 13 North Rim buildings and rehabilitation of the historic restroom in the campground. Cumulative beneficial effects of any action

alternative, along with past, present, and reasonably foreseeable actions, would be moderate, site-specific, and long-term.

Impairment

Adverse impacts under any of the alternatives would be minor or moderate. Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the Park or to opportunities for enjoyment of the Park; or (3) identified as a goal in the Park's general management plan or other relevant NPS planning documents, there would be no impairment of the Park's resources or values.

Conclusion

The No-Action Alternative would have minor, adverse, long-term, indirect effects on 28 buildings that contribute to the significance of the North Rim Inn and Campground Historic District and the historic cultural landscape. Any of the action alternatives would have moderate, beneficial, long-term effects on the 28 buildings, the North Rim Inn and Campground Historic District, and the historic cultural landscape. Of the action alternatives, the preferred alternative would have the least adverse impact on cultural resources, with only a minor, adverse, long-term effect on the historic cultural landscape. Both Alternative C and Alternative D would have moderate, adverse, long-term effects on the North Rim Headquarters Historic District and the historic cultural landscape. Adverse cumulative effects would be moderate, local, and long-term. Beneficial cumulative effects would be moderate, long-term, and site-specific.

After applying the Advisory Council on Historic Preservation's criteria of adverse effects (36 CFR Part 800.5, *Assessment of Adverse Effects*), the National Park Service concludes that implementation of the preservation treatments for the exposed frame cabins under Alternative B, C, or D would have no adverse effect on cultural resources. Under Alternative B (the preferred alternative), the emergency services/wildland fire facility would have no effect on historic properties. Implementation of the emergency services/wildland fire facility plans under Alternative C or D would result in substantial changes to the North Rim Headquarters Historic District and would constitute an adverse effect to cultural resources.

VIEWSCAPES

Affected Environment

The edge of the North Rim on Bright Angel Peninsula offers spectacular views of Transept Canyon, Bright Angel Canyon, and the Grand Canyon. The visual character of the landscape away from the rim is typical of the Kaibab Plateau, a rolling plateau cut by drainages and canyons as deep as 122 m (400 feet). The major vegetation type at the North Rim is Rocky Mountain montane conifer forest, with spruce/fir/aspen associations and ponderosa pine forest. Forested areas are interspersed with mountain meadow associations. The canopy height of mature trees is 23-30 m (75-100 feet). Sight distance within the forested areas varies with forest type. Within spruce/fir/aspen associations, low branches on trees and young trees in the understory limit visibility. Ponderosa pine forests are more open and park-like, with no branches on the lower trunks. Within the developed area at the North Rim, most areas are vegetated by open ponderosa pine stands, and sight distance below the canopy is generally 100 m (328 feet) or more. Roads, buildings, and other uses have created areas of disturbance within the ponderosa pine stands.

Parking areas and a variety of buildings of divergent architectural styles have been introduced into the landscape, and these developments have caused disruptions in the forest canopy.

Environmental Consequences

The thresholds of change for the intensity of an impact on viewscapes are defined as follows:

Negligible – a change in viewscapes that is barely detectable.

Minor – a change in viewscapes that is slight but detectable.

Moderate – a change in viewscapes that is readily apparent.

Major – an extreme change in viewscapes.

Alternative A – No Action

Direct/Indirect Effects. Existing development, roads, and utility corridors have resulted in impacts to the visual resources through alteration of the forest canopy and creation of visual clutter. These past impacts are moderate, adverse, site-specific, and long-term. Continuation of current Park policies under the No-Action Alternative would maintain the current condition of visual resources. No construction activities are proposed under Alternative A, and no direct impacts to visual resources would occur if this alternative were implemented. Under the No-Action Alternative, the exposed frame cabins would continue to deteriorate. This indirect effect would be minor, adverse, long-term, and site-specific.

Effects Common to All Action Alternatives

Direct/Indirect Effects. All action alternatives would result in preservation treatments of the historic exposed frame cabins. These cabins are adjacent to the North Rim campground and are visible to all visitors to the campground. The cabins currently appear dilapidated. Restoration, rehabilitation, or reconstruction of the cabins would improve their appearance while maintaining their historic integrity. This would constitute a minor, beneficial, long-term, site-specific effect on visual resources. The heilibase support facilities are not visible from areas frequented by visitors, and replacement of these facilities would have no effect on viewscapes.

Alternative B – Preferred Alternative

Direct/Indirect Effects. At the water tank site, the emergency services/wildland fire facility would be partially screened from the main road by approximately 34 m (110 ft) of intact, dense, mixed conifer vegetation. The facility would be visible from the road to alert visitors. This would constitute a minor, adverse, long-term, site-specific effect on visual resources. Trenching for utilities would cross Highway 67 and would be visible to all visitors at the North Rim. The trench would be placed as much as possible in natural openings in the vegetation and would be unlikely to cause disruptions in the canopy. Trenching would affect visual resources during installation of the utilities and after construction until ground vegetation recovers. This would be a moderate, short-term, site-specific, adverse impact to viewscapes.

Alternative C – Generator Site

Direct/Indirect Effects. At the generator site, the emergency services/wildland fire facility would be in a direct line of sight for southbound (incoming) visitors and would be the first building visible to visitors

arriving at the North Rim. The building would not be in a direct line of sight for visitors exiting the North Rim, but would still be visible. The building would be screened from the road by approximately 46 m (150 feet) of sparse forest vegetation. Trenching for utilities under this alternative would not be visible to most visitors. This alternative would have a moderate, adverse, long-term, site-specific effect on viewscapes.

Alternative D – Administrative Site

Direct/Indirect Effects. At the administrative site, the emergency services/wildland fire facility would visible to visitors both entering and leaving the North Rim developed area. The building would be screened from the road by approximately 46 m (150 feet) of sparse forest vegetation. Presence of the building would have a moderate, adverse, long-term, site-specific effect on viewscapes. Trenching for utilities would be visible to alert visitors. Trenching would have a short-term, minor, adverse, site-specific effect on visual resources.

Cumulative Impacts

Construction of existing development, roads, and utility corridors has resulted in impacts to viewscapes through alteration of the forest canopy and creation of visual clutter. These past impacts are moderate, adverse, site-specific, and long-term. All future foreseeable projects would occur within the developed areas of the North Rim and would result in minimal tree removal. Some projects would have minor, adverse, site-specific, short-term effects on viewscapes through increased visual clutter. The presence of construction materials and equipment, excavation of utility lines, removal of existing buildings, and construction of new buildings would all temporarily increase visual clutter. Some projects, such as the campground rehabilitation, would have long-term, minor, site-specific, beneficial effects on visual quality through the rehabilitation of historic structures. Adverse cumulative impacts of any action alternative, along with past, present, and reasonably foreseeable actions, would be moderate, site-specific, and long-term and minor, site-specific, and short-term.

Impairment

Adverse impacts under any of the alternatives would be minor or moderate. Because there would be no major, adverse impacts to a resource or value whose conservation is (1) necessary to fulfill specific purposes identified in the establishing legislation or proclamation of Grand Canyon National Park; (2) key to the natural or cultural integrity of the Park or to opportunities for enjoyment of the Park; or (3) identified as a goal in the Park's general management plan or other relevant NPS planning documents, there would be no impairment of the Park's resources or values.

Conclusion

The No-Action Alternative would have minor, adverse, site-specific, long-term effects on visual resources. All the action alternatives would have beneficial, minor, site-specific, long-term effects. Of the action alternatives, the preferred alternative would have the least adverse impact on viewscapes, having site-specific effects that are long-term and minor and short-term and moderate. Both Alternative C and Alternative D would have moderate, long-term, site-specific, adverse effects on visual resources. Alternative D would also have minor, short-term, adverse, site-specific effects on visual resources. Beneficial cumulative impacts to viewscapes under any action alternative would be long-term, minor, and site-specific. Adverse cumulative impacts would be minor to moderate, site-specific, and short-and long-term.

VISITOR EXPERIENCE

Affected Environment

Approximately 10 percent of visitation to the Grand Canyon occurs at the North Rim (NPS 2002). Visitors to the North Rim encounter less traffic congestion and parking problems than visitors to the South Rim, and the North Rim provides a more leisurely pace and a more traditional park experience than the South Rim. All visitors to the Bright Angel Peninsula of the North Rim pass through Jacob Lake, at the junction of Arizona 67, where the U.S. Forest Service operates a visitor contact station. Information on Grand Canyon National Park and the Kaibab National Forest is available at this station. At the North Rim entrance station to the Park, each vehicle receives an official park brochure along with a copy of the North Rim edition of the park newspaper. The only other staffed interpretive facility on the North Rim is the Visitor Center, located adjacent to the Grand Canyon Lodge.

Visitors would generally not interact with the emergency services/wildland fire facility, the exposed frame cabins, or the helibase support facilities. Visitors could, however, be affected by construction vehicles, noise, and traffic delays.

Environmental Consequences

The thresholds of change for the intensity of an impact on visitor experience are defined as follows:

Negligible – the impact is barely detectable, and/or will affect few visitors.

Minor – the impact is slight but detectable, and/or will affect some visitors.

Moderate – the impact is readily apparent and/or will affect many visitors.

Major – the impact is severely adverse or exceptionally beneficial and/or will affect the majority of visitors.

Alternative A – No Action

Direct/Indirect Effects. Under the No-Action Alternative, existing facilities and policies would remain in place. No additional construction would take place, and there would be no effects on the visitor experience.

Effects Common to All Action Alternatives

Direct/Indirect Effects. Under any action alternative, the exposed frame cabins would be rehabilitated. Because the cabins are adjacent to the North Rim campground, visitors may be affected by construction noise. These effects would be minimized by limiting construction activities to 8:00 am to 6:00 pm in the summer (May 1- September 30) and to 9:00 am to 5:00 pm during the rest of the year. Construction activities would not occur on Saturdays, Sundays, or holidays unless previously approved by the Park. Effects of cabin rehabilitation on visitor experience would occur only during construction. Adverse impacts to visitors would be local, short-term, and minor.

Alternative B – Preferred Alternative

Direct/Indirect Effects. Under Alternative B, the emergency services/wildland fire facility would be constructed near the water tanks on the east side of Highway 67. Because existing sewer and electrical utilities are on the west side of Highway 67, construction of the facility in this location would require trenching across the highway. Trenching would require approximately 2 days and would result in the closure of one lane of traffic. Effects on the visitor experience would be minimized by limiting traffic disruptions to 15 minutes in any one direction. Traffic associated with the construction could also cause minor delays and congestion. The water tank site is approximately 450 m (1,476 feet) from the campground and over 1.6 km (1.0 mile) from Bright Angel point, which is the destination for the majority of visitors. Construction noise would therefore have minor effects on the visitor experience. There are no visitor services at the water tank site, and construction of the facility in this location would have no long-term effects on the visitor experience. Overall, the effects of construction on visitor experience would be minor, adverse, local, and short-term.

Alternative C – Generator Site

Direct/Indirect Effects. Under this alternative, the emergency services/wildland fire facility would be constructed north of the generator building, on the west side of Highway 67. All utilities are available on the west side of the highway, and no trenching or traffic disruptions would be required. Traffic associated with construction could cause minor delays and congestion. The generator site is over 610 m (2,000 feet) from the campground and over 1.6 km (1.0 mile) from Bright Angel point. Construction noise would therefore have minor effects on the visitor experience. Placement of the facility at the generator site would require the access road to the facility to enter Highway 67 in a stretch where sight distance in either direction is only 100 m (328 feet). This short sight distance would produce a traffic safety hazard and increase the likelihood of vehicular collisions. Overall, the short-term effects of construction on visitor experience would be minor, adverse, and local. The traffic hazard would create a long-term, moderate, adverse, local impact on the visitor experience.

Alternative D – Administrative Site

Direct/Indirect Effects. Under this alternative, the emergency services/wildland fire facility would be constructed between Highway 67 and the administrative area on the west side of the highway. All utilities are available on the west side of the highway, and no trenching or traffic disruptions would be required. Traffic associated with construction could cause minor delays and congestion. The administrative site is approximately 450 m (1,476 feet) from the campground and over 1.6 km (1.0 mile) from Bright Angel point. Construction noise would therefore have minor effects on the visitor experience. Overall, the short-term effects of construction on visitor experience would be minor, adverse, and local. Because the administrative site is adjacent to administrative facilities and the backcountry office but would have a separate entrance, this location may produce confusion for visitors trying to reach the backcountry office. This would produce an adverse, long-term, minor, local impact on the visitor experience.

Cumulative Impacts

Of the foreseeable future projects at the North Rim, construction of the administrative building, rehabilitation of the campground, and upgrades to the water distribution system would occur in 2003, concurrently with construction of the emergency services/wildland fire facility, replacement of the helibase support facility, and preservation treatments of the exposed frame cabins. Installation of fire sprinklers and rehabilitation of the firing range would also occur during 2003, but these activities would

not affect areas used by visitors. Multiple construction projects would result in visible construction activities in several areas and in increased traffic from construction vehicles. None of the projects would restrict visitor movements or affect the highest use areas (lodge and rim). All construction activities would be restricted to daylight hours and would not occur on weekends or holidays unless otherwise approved by the Park. Therefore, any action alternative, when combined with past, present, and foreseeable future actions, would have a short-term, adverse, moderate, and local cumulative impact to the visitor experience. Many of the future projects are designed to benefit the visitor experience through upgrades to existing facilities (e.g., campground, parking, and orientation exhibits) and installation of new facilities (e.g., restrooms) where needed. Therefore, long-term cumulative effects on the visitor experience would be beneficial, moderate, and local.

Conclusion

Of the action alternatives, the preferred alternative would have the least adverse effects on the visitor experience because it would not result in conflicts between visitor and emergency traffic or in confusion for visitors trying to reach the backcountry office or administrative facilities. There would be no long-term effects under Alternative B, and short-term effects would be minor, adverse, and local. Alternatives C and D would cause long-term, adverse, local, minor or moderate impacts to the visitor experience as well as minor, adverse, local, short-term effects. Adverse cumulative impacts under any alternative would be short-term, local, and moderate, and beneficial cumulative impacts would be long-term, local, and moderate.

PARK OPERATIONS

Affected Environment

Park operations refer to the adequacy of staffing levels and the quality and effectiveness of the park infrastructure in protecting and preserving vital resources and providing for an effective visitor experience. Infrastructure facilities include the roads that are used to provide access to and within the park (both administrative and visitor use), housing for staff required to work and live in the park, visitor orientation facilities (visitor centers, developed and interpreted sites, and other interpretive features), administrative buildings (office and workspace for park staff), management support facilities (garages, shops, storage buildings, and yards used to house and store maintenance equipment, tools, and materials), and utilities such as phones, sewer, water, and electric.

Environmental Consequences

Impacts to park operations focus on (1) employee and visitor health and safety; (2) ability to protect and preserve resources; (3) staff size, whether staffing needs to be increased or decreased; (4) existing and needed facilities; (5) communication (e.g., telephones, radio, computers, etc.); and (6) appropriate utilities (sewer, electric, water). Definitions for levels of impacts to park operations efficiency are as follows:

Negligible – a change in operations that is not measurable or perceptible.

Minor – a change in operations that is slight and localized with few measurable consequences.

Moderate – readily apparent changes to park operations with measurable consequences.

Major – a severely adverse or exceptionally beneficial change in park operations.

Alternative A – No Action

Direct/Indirect Effects. Under the No-Action Alternative, maintenance of the current facilities would continue. Indirect impacts would include the increased maintenance required as the existing buildings age. Continuing to house emergency vehicles in an outdated building that violates NFPA standards, limits access to supplies, and requires dismantling a portion of the fire engine would compromise the effectiveness of the emergency response system at the North Rim. Continuing to house the wildland fire crew in substandard facilities would also compromise the ability of the Park to carry out wildland fire programs by limiting the recruitment and retention of fire crew members. These impacts would be moderate, local, long-term, and adverse.

Effects Common to All Action Alternatives

Direct/Indirect Effects. Preservation treatments of the exposed frame cabins for use by the wildland fire crew would enhance the Park's ability to carry out its wildland fire program by allowing increased recruitment and retention of wildland fire employees. After preservation treatments are applied, these facilities would require less maintenance than the old trailers and cabins that are currently used to house portions of the wildland fire crew.

Under any of the action alternatives, caches for emergency, search and rescue, and fire equipment would be housed in the same facility as emergency response vehicles. The new facility would have adequate room to permit indoor storage of all emergency and fire vehicles and would not require portions of the fire engine to be dismantled prior to storage. These improved facilities would allow the Park to respond to emergencies in a prompt and efficient fashion. A new facility would also require less maintenance than the facilities currently being used for emergency services and wildland fire. Any of the action alternatives would result in moderate, long-term, local, beneficial effects on park operations.

Cumulative Impacts

All of the foreseeable future actions are designed to have long-term, beneficial impacts on park operations through upgrades to facilities such as the administrative building, housing, offices, utilities, and other infrastructure. The cumulative beneficial effect of any action alternative, when combined with past, present, and reasonably foreseeable future actions, on park operations would be moderate, long-term, and local. Construction activities could have short-term, adverse impacts on park operations through disruptions in traffic patterns, utility services, and availability of office space. These impacts would be local and minor to moderate.

Conclusion

The No-Action alternative would result in moderate, local, long-term, adverse effects on park operations, while any of the action alternatives would have moderate, long-term, local, beneficial effects on park operations. Cumulative impacts on park operations would be long-term, beneficial, local, and moderate and adverse, short-term, local, and minor to moderate.

CHAPTER 4 – LIST OF PREPARERS

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CHAPTER 5 – CONSULTATION WITH OTHERS

The following organizations and agencies were contacted for information or assisted in identifying important issues, developing alternatives, or analyzing impacts.

Arizona Game and Fish Department

NPS staff met with personnel from AGFD on 13 December 2000 to discuss this project proposal and other future proposals. A list of species of concern for projects at the North Rim was discussed at this meeting.

Public Involvement

Public involvement is described in the Scoping section of Chapter 1 of this document. Responses to scoping were received from the Navajo Nation and the Southwest Utah Five County Association of Governments, neither of which had any concerns with the project. Two members of the public responded requesting to receive a hard copy of the EA.

State Historic Preservation Office

The NPS sent scoping letters on 29 November 2000 and 26 July 2002 to the State Historic Preservation Office (SHPO). SHPO issued a support letter regarding the preservation treatments of the exposed frame cabins on 13 March 2002. The emergency services/wildland fire facility and the exposed frame cabins were discussed at a meeting with SHPO on 16 October 2002. Consultation with SHPO regarding preservation treatments for the exposed frame cabins is ongoing.

Tribal Groups

The NPS sent scoping letters on 29 November 2000 and 26 July 2002 to eight tribal groups. Although nine tribal groups have interests in the Park, only eight ask to be consulted on projects outside the river corridor.

U.S. Fish and Wildlife Service

NPS staff met with personnel from USFWS on 13 December 2000 to discuss this project proposal and other future proposals. A list of species of concern for projects at the North Rim was discussed at this meeting. NPS staff met with USFWS several times between March and June 2002 to discuss this project proposal in conjunction with a batch consultation for several construction projects throughout the Park, including the preservation treatments for the exposed frame cabins. Concurrence on the batch consultation was received from USFWS on 9 July 2002 and indicated that the projects may affect but are not likely to adversely affect the Mexican spotted owl and the California condor. Consultation with USFWS regarding the emergency services/wildland fire building is ongoing.

SELECTED REFERENCES

Executive Orders

Executive Order 11988 (Floodplain Management)

Executive Order 12898 (Environmental Justice)

Executive Order 13186 (Migratory Birds)

Director's Orders

DO-2 Planning Process Guidelines

DO-12 Conservation Planning, Environmental Impact Analysis and Decision Making

DO-28 Cultural Resource Management

DO-65 Explosives Use and Blasting Safety

NPS-77 Natural Resources Management Guideline

DO-77-1 Wetland Protection

DO-13 Environmental Leadership (DRAFT)

US Federal Government and State Government

36 CFR 800.11

40 CFR, Part 503

1864 Act of Congress (13 Stat. 325)

1890 Act of Congress (26 Stat. 650)

1906 Joint Resolution of Congress (34 Stat. 831)

1955 Federal Air Quality Law

1963 Clean Air Act, as amended

1964 Wilderness Act

1966 National Historic Preservation Act

1969 National Environmental Policy Act (NEPA)

1973 Endangered Species Act, as amended

1977 Clean Water Act

1979 Archeological Resources Protection Act

1982 National Register of Historic Places Nomination Form for Grand Canyon North Rim Headquarters District. July 22, 1982

1984 Archaeological Resources of Grand Canyon National Park (Multiple Resources Partial Inventory: Prehistoric and Historic Archaeological Sites, Historic and Architectural Properties). Draft.

1988 Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices. Office of Water, EPA 832-R 92-005. Washington, DC.

1990 Native American Graves Protection and Repatriation Act

1995a Draft General Management Plan and Environmental Impact Statement, Grand Canyon National Park. Denver Service Center.

1995b Final General Management Plan and Environmental Impact Statement, Grand Canyon National Park. Denver Service Center.

1995c General Management Plan, Grand Canyon National Park. Denver Service Center.

1995d Record of Decision for General Management Plan Environmental Impact Statement. On file at Denver Service Center.

1995 "Programmatic Agreement among the National Park Service, the Arizona State Historic Preservation Officer, and the Advisory Council on Historic Preservation Regarding the Draft General Management Plan/Environmental Impact Statement, Grand Canyon National Park, Arizona."

1998 Value Analysis in the National Park Service. NPS – Denver Service Center. Draft Version 6/4/98.

1999 Management Services – Value Analysis/Value Assessment Inventory. NPS – Denver Service Center. Draft Version 11/2/00.

2000 Letter from Arizona Game and Fish Department to National Park Service regarding North Rim projects at Grand Canyon National Park (Administration Building and Campground Rehabilitation) which referenced and listed special status species occurring in the project vicinity. January 24, 2000.

2000 Letter from USDI Fish and Wildlife Service to National Park Service regarding North Rim projects at Grand Canyon National Park (Administration Building and Campground Rehabilitation), which referenced and attached a Coconino Country threatened and endangered species list. Consultation number 2-21-92-I-204. December 14, 2000.

2001 National Park Service Management Policies. U.S. Department of the Interior, National Park Service.

2001 Value analysis study for North Rim emergency services facility site selection, Grand Canyon National Park. Final report, Denver Service Center.

2001 Value analysis study, North Rim wildland fire crew quarters. June 12, 2001. 25 pp.

2001 North Rim emergency services/wild land fire facility pre-design package. Denver Service Center. July.

2002 Letter from Arizona State Preservation Office to National Park Service supporting preservation treatments planned for the exposed frame cabins at the North Rim. 13 March 2002.

LITERATURE CITED

Architectural Resources Group (ARG). 2001. Grand Canyon North Rim frame cabins rehabilitation study, Grand Canyon National Park, Arizona. Architectural Resources Group, Architects, Planners, and Conservators, Inc. San Francisco.

Arizona Game and Fish Department (AGFD). 1996. Wildlife of special concern in Arizona (public review draft). Phoenix, AZ, 85023-4399.

Brown, D.E. 1994. Biotic Communities - Southwestern United States and Northwestern Mexico. University of Utah Press, Salt Lake City.

Camp, Phil. 2002. Personal communication (via electronic mail) between Phil Camp, Natural Resources Conservation Service, and Cole Crocker-Bedford, Grand Canyon National Park, regarding prime and unique farmlands in Grand Canyon National Park. November 11.

Chappell, G. 1982a. National Register of Historic Places Inventory-Nomination Form: North Rim Inn and Campground Historic District. National Park Service, Western Regional Office, San Francisco.

Chappell, G. 1982b. National Register of Historic Places Inventory-Nomination Form: North Rim Headquarters Historic District. National Park Service, Western Regional Office, San Francisco.

Euler, R.G. 1975. Archaeology of Bright Angel Point, Grand Canyon National Park. Ms on file Grand Canyon National Park.

Ganey, J.L., and J.L. Dick, Jr. 1995. Habitat relationships of the Mexican spotted owl: current knowledge. Chapter 4 *in* U.S. Fish and Wildlife Service. Mexican spotted owl recovery plan, volume II.

Halloran, M.E., and M. Bekoff. 1994. Nesting behavior of Abert squirrels, *Sciurus aberti*. Ethology 97: 236-248. Abstract available online at http://spot.colorado.edu/~halloran/nest.html. Accessed 13 March 2002.

Harrison, L.S. 1986. National Register of Historic Places Inventory-Nomination Form: Grand Canyon Lodge Historic District. National Park Service, Western Regional Office, San Francisco.

Hoffmeister, D.F. 1986. Mammals of Arizona. University of Arizona Press, Tucson, Arizona.

Jenness, J.S. 2000. The effects of fire on Mexican spotted owls in Arizona and New Mexico. M.S. Thesis, Northern Arizona University, Flagstaff, Arizona. Available: http://www.jennessent.com/Literature/Thesis.

Latta, M.J., C.J. Beardmore, and T.E. Corman. 1999. Arizona Partners in Flight Bird Conservation Plan. Version 1.0. Nongame and Endangered Wildlife Program Technical Report 142. Arizona Game and Fish Department, Phoenix, Arizona.

Mejia, J.R. 1997. *Sciurus aberti* species account. University of Michigan, Museum of Zoology, Animal Diversity Web, [Online]. Available:

http://animaldiversity.ummz.umich.edu/accounts/sciurus/s._aberti$narrative.html. Accessed 5 March 2002.

Nash, D.J., and R.N. Seaman. 1977. *Sciurus aberti*. Mammalian species, No. 80. The American Society of Mammalogists. 5 pp.

National Park Service (NPS). 1991. Natural Resources Management Guideline, NPS-77. U.S. Department of Interior, Washington D.C.

National Park Service (NPS). 1995. Draft General Management Plan Environmental Impact Statement, Grand Canyon National Park, Arizona.

National Park Service (NPS). 2001a. Director's Order #12: Conservation planning, environmental impact analysis, and decision-making.

National Park Service (NPS). 2001b. Management policies. [Online]. Available: http://www.nps.gov/policy/mp/policies.html.

National Park Service (NPS). 2001c. Value analysis study for North Rim emergency services facility site selection, Grand Canyon National Park. Final report, Denver Service Center.

National Park Service (NPS). 2001d. Value analysis study, North Rim wildland fire crew quarters. June 12, 2001. 25 pp.

National Park Service (NPS). 2001e. Environmental Assessment/Assessment of Effect: Desert View housing and management support, Grand Canyon National Park, Arizona. Grand Canyon National Park.

National Park Service (NPS). 2001f. Environmental Assessment: North Rim administrative building, Grand Canyon National Park, Arizona. Grand Canyon National Park.

National Park Service (NPS). 2002. Visitation counts by gate and mode of travel. [Online]. Available: http://www.nps.gov/grca/facts/chart-2000s.pdf. Accessed 17 September 2002.

OCULUS. 2002. North Rim Bright Angel Peninsula Developed Area, Grand Canyon National Park: Cultural Landscape Report, 70% draft. Prepared by OCULUS Landscape Architects, Charlottesville, Virginia.

Page, R.R. 2001. Cultural landscapes inventory professional procedures guide. U.S. Department of the Interior, National Park Service, Cultural Resource Stewardship Partnerships, Park Historic Structures and Cultural Landscapes Program, Washington, D.C.

Peregrine Fund. 2000. Notes from the Field. [Online]. Available: http://www.peregrinefund.org/notes_condor.html.

Reynolds, R.T., R.T. Graham, M.H. Reiser, R.L. Bassett, P.L. Kennedy, D.A. Boyce, Jr., G. Goodwin, R. Smith, and E.L. Fisher. 1992. Management recommendations for the northern goshawk in the southwestern United States. U.S. Forest Service, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado. U.S. Forest Service General Technical Report RM-217. 90 pp.

Rosenstock, S.S. 1996. Habitat relationships of breeding birds in Northern Arizona ponderosa pine and pine-oak forests. Arizona Game and Fish Department, Technical Report #23. Phoenix, Arizona.

Spotskey, D.B., and D. Bertolette. 2000. North Rim vegetation and fuels mapping. Internal NPS report, Grand Canyon National Park.

Spotskey, D.B., and D.A. Willey. 2000. Grand Canyon National Park predicted Mexican spotted owl habitat. Draft 8-2000. National Park Service and U.S. Geological Survey.

U.S. Fish and Wildlife Service (USFWS). 1995. Recovery plan for the Mexican spotted owl. Albuquerque, New Mexico.

U.S. Fish and Wildlife Service (USFWS). 2000. Peregrine Falcon. [Online]. Available: http://endangered.fws.gov/i/b/sab22.html.

Ward, J.P., Jr., and W.M. Block. 1995. Mexican spotted owl prey ecology. Chapter 5 *in* U.S. Fish and Wildlife Service. Mexican spotted owl recovery plan, volume II.

Warren, P.L., K.L. Reichhardt, D.A. Mouat, B.T. Brown, and R.R. Johnson. 1982. Vegetation of Grand Canyon National Park. Technical Report No. 9, Cooperative National Park Resources Studies Unit, University of Arizona, Tucson, Arizona.

Willey, D.W. 1995. Mexican spotted owls in canyonlands of the Colorado Plateau. *In* E.T. LaRoe, G.S. Farris, C.E. Puckett, P.D. Doran, and M.J. Mac, eds. Our living resources: A report to the Nation on the distribution, abundance, and health of U.S. plants, animals, and ecosystems. U.S. Department of the Interior, National Biological Service, Washington, D.C.

Willey, D.W. and R.V. Ward. In prep. Inventory for Mexican spotted owls in side canyon habitat of Grand Canyon National Park. Interim Report 2001.

APPENDIX A

SCOPING LETTERS

United States Department of the Interior

NATIONAL PARK SERVICE
Grand Canyon National Park
P.O. Box 129
Grand Canyon, Arizona 86023-0129

IN REPLY REFER TO:

November 29, 2000

Dear Friend of the Grand Canyon:

Reference: Grand Canyon National Park Packages 6, 28, 47, 48, 53, 54

Subject: Comments on proposed North Rim projects (general scoping)

The National Park Service (NPS) is in the initial stages of planning for multiple projects on the North Rim. These projects are expected to start construction this fiscal year or the following fiscal year. All of these projects are needed to repair problems with existing infrastructure, to better protect natural and cultural resources, to provide a safer, more enjoyable visitor experience, or to enable park staff to complete their jobs more safely and effectively. They all are either specifically identified in or are consistent with the 1995 Grand Canyon National Park *General Management Plan*.

Environmental assessments will be prepared to facilitate the decision-making process for these projects. The projects are summarized below (listed in no particular order), along with a brief justification for why the work is needed, and are displayed on the attached map.

1. **Rehabilitation of the North Rim water distribution system. This project would replace** approximately 14,500 linear feet of worn-out, leaky, undersized, and shallow water lines with new water pipes. New fire hydrants would also be installed.

   There are many problems with the existing North Rim potable water distribution system. Many lines are old, are in poor condition, and are leaking (estimated at more than 11,000 gallons per day). Some pipes needed for the shoulder seasons are too shallow to protect against freezing. The water pressure in areas also is too low to safely operate fire sprinkler systems or even satisfy ordinary domestic needs.

2. **Rehabilitation of the North Rim Campground and Relocation of the Lodge Road**. The campground portion of this project would re-surface the roads within the campground, relocate the entry road configuration, construct a new fee collection station and demolish the existing one, construct four campsite access spurs for tent camping, and construct a new parking area entry. The total amount of disturbance would be approximately 0.3 acres. These project components have been proposed to address the following concerns: campground roads are severely deteriorated and are causing soil compaction and erosion problems; The existing entry road configuration no longer efficiently accommodates the current volume of

visitors. Vehicle stacking in front of the fee collection station frequently blocks vehicle access to the nearby store; The existing configuration does not adequately provide for increased parking needs and easy vehicle exit from the campground; tent camping sites are not paved and are ill-defined, causing resource problems; the existing fee collection station is inadequately providing for the needs of the employees who work in it and the campground registration system.

The Lodge road portion of this project would change public access routes to the Lodge. Public traffic would be routed into the main parking area, allowing only service vehicles to park next to Grand Lodge. The terminus of the main road would be reconfigured to allow for tour buses to turn around and discharge and pickup guests. The main parking area would be reconfigured to allow for RV and bus parking. The existing road segment between the parking area and the lodge would be converted primarily to pedestrian use. These project components have been proposed to address the following concerns: The current configuration of the road to the lodge is causing traffic congestion and vehicle/pedestrian conflicts, diminishing the visitor experience and increasing safety concerns.

3. **Rehabilitation of the North Rim entrance station.** The historic entrance station has fallen into disrepair and needs to be rehabilitated. Facilities at the site also need to be upgraded to provide essential visitor services and to enable park staff to accomplish their jobs more effectively. In particular, the station has a very poor ventilation system, resulting in park staff breathing auto exhaust fumes. There are no permanent restrooms for staff or visitors. The single entrance lane creates long lines and delays park staff and visitors. The signs in the area are old and outdated. The Park has not yet developed a specific proposal for how best to address the needs for action listed above, but is considering options for repairing or replacing the existing building, reconfiguring the road and parking lot, replacing the entrance sign and gate and constructing a new restroom.

4. **Construction of a North Rim emergency services building.** A 4,193 square-foot building would consolidate all EMS operations into one location and replace several smaller buildings. It would house emergency vehicles and equipment, provide a temporary prisoner holding facility, and provide office space and a training room.

   The existing fire station is too small for modern emergency vehicles and is not able to hold all emergency service equipment and supplies. Portions of the fire engine must be disassembled before it can be stored and then be reassembled before it can respond to a call, resulting in delayed response times. The existing building has safety problems due to inadequate ventilation of vehicle exhaust fumes and a lack of safeguards for keeping prisoners in the building. Having emergency equipment stored in separate locations reduces operational efficiency.

5. **Construction of a North Rim wildland fire facility.** This facility would consist of a 5,300 square-foot space for housing a fire crew, 1,800 square feet of offices, a 2,800 square-foot space for a fire engine, and space for a helibase, fire cache, and storage for hazardous materials.

The existing housing facilities for the fire crew does not meet NPS standards. The fire crew now stays in old cabins that are uninsulated and are rodent infested, or in tent frames in locations that often experience below freezing temperatures during the times they are in use. The wildland fire engine also must park outside, which increases maintenance costs and reduces the availability of the engine to respond to fires. There is also insufficient space for offices and for storage of equipment and supplies.

6. **Construction of restrooms.** This project would construct or repair and rehabilitate restrooms at Cape Royal, Point Imperial, Widforss Trailhead, North Kaibab Trailhead, and Toroweep Overlook. Restrooms would be a combination of flush, vault, or composting configurations depending upon the availability of water and sewer connections and the level of use.

   Many of the existing restrooms are old, overused, do not meet accessibility requirement, or are portable toilets. The poor condition or lack of sufficient restrooms is the primary visitor complaint for the park. In some areas, the restrooms are in such demand or poor condition that many visitors prefer to use the woods, resulting in unsafe and unsanitary conditions.

7. **Rehabilitation of old landfills.** This project would rehabilitate two old landfills at Marble Flats and Lindberg Hill areas. This would entail capping of the landfills, establishing run-off controls, and installation of monitoring wells to properly close the landfills in accordance with state and federal regulations.

   The two existing landfills are inactive solid waste landfills closed in 1991. Neither landfill was properly closed. The Park is currently in violation of state and federal regulations. This project is needed to comply with terms of a consent order.

8. **Construction of a new North Rim Visitor Services/Administration Building.** This project would demolish the existing visitor services/administrative building and construct a larger 2,467 square foot building near the same site. The new building would support the North Rim backcountry permit system, visitor contact services, public restroom and administrative offices. Various building designs are being considered in order for the building to be compatible with the adjacent cultural landscape and the historic district, while still accommodating the administrative and visitor needs of the building. The proposed new building layout would include a 15-car, 2-RV parking area, concrete walkways and a new access road to the parking area from the main road. Most of the ground disturbance would be in areas already disturbed (i.e. the existing building footprint) or open areas. Tree removal will primarily be limited to the entrance road. The parking area would be configured as a loop to allow for easy ingress and egress of vehicles, while maintaining existing ground cover and trees in the center. The proposed building and parking area would be located near the footprint of the original Headquarters building and between existing residential areas. The current road access to the existing visitor services/administrative building would no longer be used by visitors and would be restricted to residential and administrative use.

   This project is needed to address the following management concerns: The existing visitor services/administrative building for the North Rim District replaced the original building

that was destroyed by fire in 1983. The current building is a temporary pre-manufactured structure installed in 1984. It has deteriorated from the effects of heavy snows and snowmelt for which the structure was not designed. The location of the current building is not conducive to the increased volume of traffic that has occurred within the Park and has created traffic and parking congestion within an otherwise primarily residential area. The existing building is also not of sufficient size to fully accommodate the increasing administrative needs of the North Rim Unit.

The purpose of this scoping letter is to describe the initial proposed actions for these projects and solicit comments from those who may have issues or concerns with the proposals. We would like your comments before we proceed further with the environmental analyses for these projects. If you have issues or concerns with any of the specific projects described above, please send your comments by January 8, 2001 to:

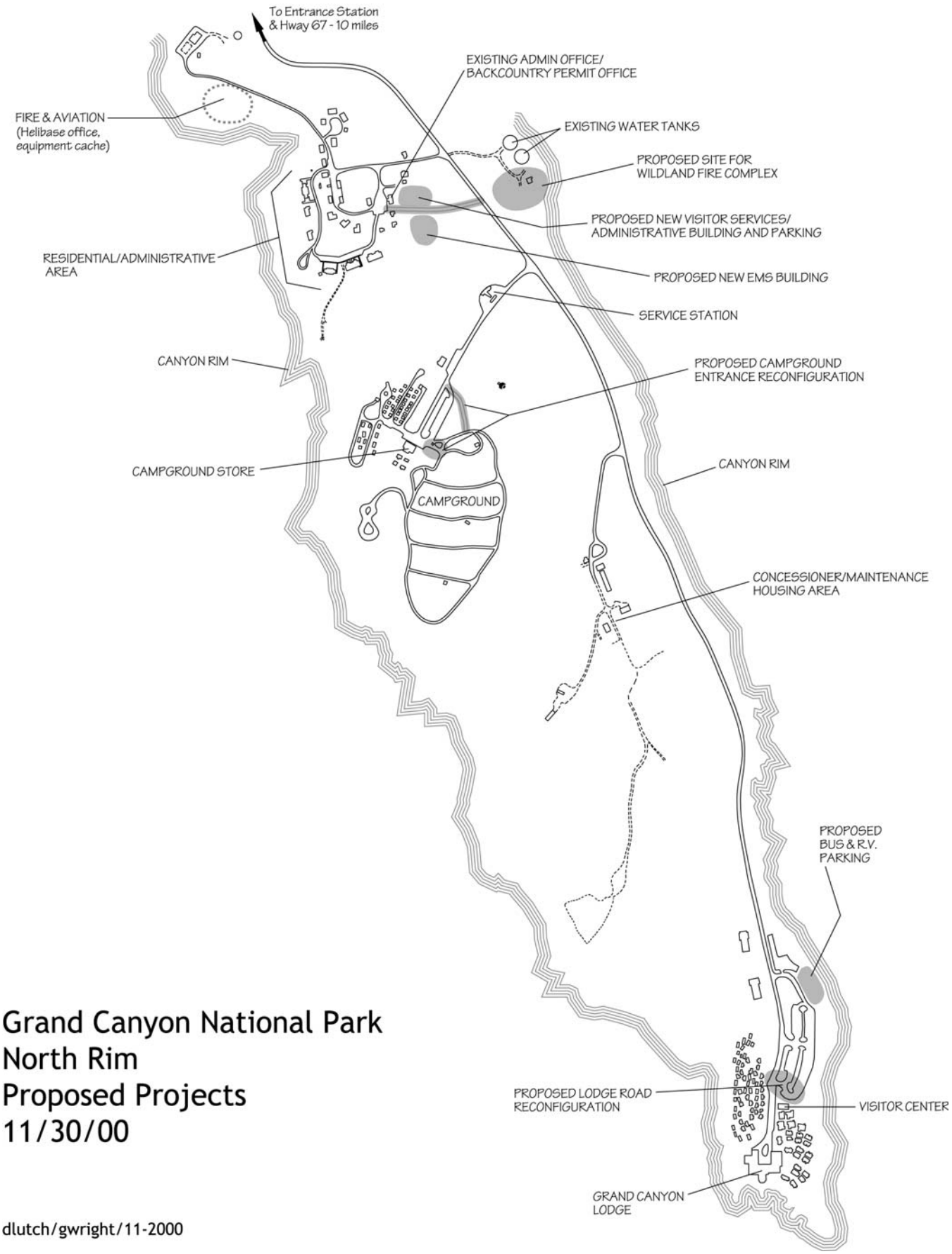
Sara White, Chief Compliance Officer
Grand Canyon National Park
P.O. Box 129
Grand Canyon, AZ 86023

Please be aware that names and addresses of respondents may be released if requested under the Freedom of Information Act. Our practice is to make comments, including names and home addresses of respondents, available for public review during regular business hours. Individual respondents may request that we withhold their home address from the record, which we will honor to the extent allowable by law. There also may be circumstances in which we would withhold from the record a respondent's identity, as allowable by law. If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment. We will make all submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public inspection in their entirety. Anonymous comments may be included in the public record. However, the National Park Service is not legally required to consider or respond to anonymous comments.

If you have any questions regarding the projects, please call Sara White at 520-638-7956.

Sincerely,

Joseph Alston
Acting Superintendent



Grand Canyon National Park
North Rim
Proposed Projects
11/30/00

dlutch/gwright/11-2000

United States Department of the Interior

NATIONAL PARK SERVICE
Grand Canyon National Park
P.O. Box 129
Grand Canyon, Arizona 86023-0129

IN REPLY REFER TO:

D18 (GRCA 8219)

July 26, 2002

Dear Interested Party:

Subject: North Rim Wildland Fire/Emergency Services Facility and Rehabilitation of Exposed Frame Cabins

Reference: Request for Comments on Initial Proposed Action (General Scoping)

The National Park Service (NPS) is in the planning stages for the construction of a new wildland fire/emergency services facility and the rehabilitation of historic exposed frame cabins for seasonal and temporary housing. These projects are located on the North Rim of Grand Canyon National Park (see attached map).

The NPS sent out a general scoping letter in December 2000 that described several projects on the North Rim that were in initial planning phases and requested comments from the public and other agencies on the proposals. Construction of an emergency services building and construction of a wildland fire building were described in that scoping letter. Since that time, based on continued planning efforts and input from various park staff, NPS has modified the proposal for these buildings so that the proposal now includes the construction of one combined wildland fire/emergency services facility to address the needs of both of these functions. These proposals are described below, along with the proposal to rehabilitate historic cabins.

a. Purpose and Need for Action:

1) Emergency Services/Wildland Fire Facility: The existing facility that is currently used to store the fire truck and ambulance for the North Rim dates back to the 1930s. The building is a two-stall wood "garage" with swinging doors. The size of fire trucks and ambulances have changed significantly since that time. When the building is occupied, there is no room to walk about or provide service to vehicles and is very difficult to access other equipment and materials in the building without moving the vehicles. Part of the purpose of a new facility would be to adequately house modern fire and emergency services vehicles and equipment, while also addressing the need for additional storage for search and rescue equipment, additional administrative space, and a holding facility for arrests. The new facility would bring the park into compliance with Occupational Health and Safety Administration (OSHA) and National Fire Protection Act (NFPA) standards for fire stations.

2) Cabins: Wildland Fire personnel are currently stationed on the North Rim from late March through November. This season is often extended to accomplish fuel reduction projects. Permanent seasonal employees are housed in old trailers, old cabins that are in need of repair, or are required to live

in tents. During the early spring and late fall months, the ability to accomplish Wildland Fire projects is limited by the housing that is available. This lack of housing has severely strained the Wildland Fire effort on the North Rim and affected employee retention, as well as the ability to recruit new employees.

b. Proposed Action:

1) Emergency Services/Wildland Fire Facility: A combined facility would be constructed to house both emergency services functions and wildland fire functions. The facility would be approximately 10,590 square feet and would be "L" shaped with emergency services facilities grouped at one end, wildland fire facilities grouped at the other end with shared spaces in between. The new facility would include such things as apparatus storage, fire, emergency services and search and rescue caches, ambulance and squad rescue storage, patrol vehicle storage, office space, holding cells, restrooms, workrooms, and a conference room. The new facility would be constructed adjacent to the water storage tanks, east of the North Rim entrance road and across from the road that leads to the North Rim Unit office (see attached map). Site design would include rehabilitation of an existing dirt road to create a paved north access road, construction of parking areas, a service road, and a paved south access road.

2) Cabins: The historic exposed frame cabins would be rehabilitated to create needed seasonal and temporary housing for fire crews and other seasonal employees on the North Rim. There are a total of 28 structures in the cabin complex, including a laundry and shower facility and 26 cabins that were originally used for lodging. All 28 buildings would be rehabilitated under this proposed action. The extent of the efforts necessary to make the cabins functional again will vary, depending on the existing condition of each cabin. All work will be conducted in accordance with the Secretary of the Interior's Standards for the Treatment of Historic Properties and in consultation with the State Historic Preservation Office. Exterior rehabilitation will consist of items such as repairing and/or replacing roofs, siding, flooring, windows, and doors. Interior rehabilitation would consist of items such as installing kitchenette units, repairing or replacing bathroom fixtures, and installing indoor water heaters. The cabins are located near the North Rim campground (see attached map).

Before we begin the environmental analysis for this project, we would like to hear your viewpoints on the action and any issues or concerns you have regarding the proposal. **Please send your comments to the address below, or email Sara White, Compliance Officer, at sara_white@nps.gov no later than August 26, 2002.**

Grand Canyon National Park
Attn: Sara White, Compliance Officer
P.O. Box 129
Grand Canyon, AZ 86023

Please be aware that names and addresses of respondents may be released if requested under the Freedom of Information Act. Our practice is to make comments, including names and home addresses of respondents, available for public review during regular business hours. Individual respondents may request that we withhold their home address from the record, which we will honor to the extent allowable by law. There also may be circumstances in which we would withhold from the record a respondent's identity, as allowable by law. If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment. We will make all submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public inspection in their entirety. Anonymous comments may be included in the

public record. However, the National Park Service is not legally required to consider or respond to anonymous comments.

We appreciate your input on this proposal. If you have any questions regarding the project, please call Debbie Lutch, Natural Resources Specialist, at (928) 774-0095 or Sara White, Compliance Officer, at (928) 638-7956.

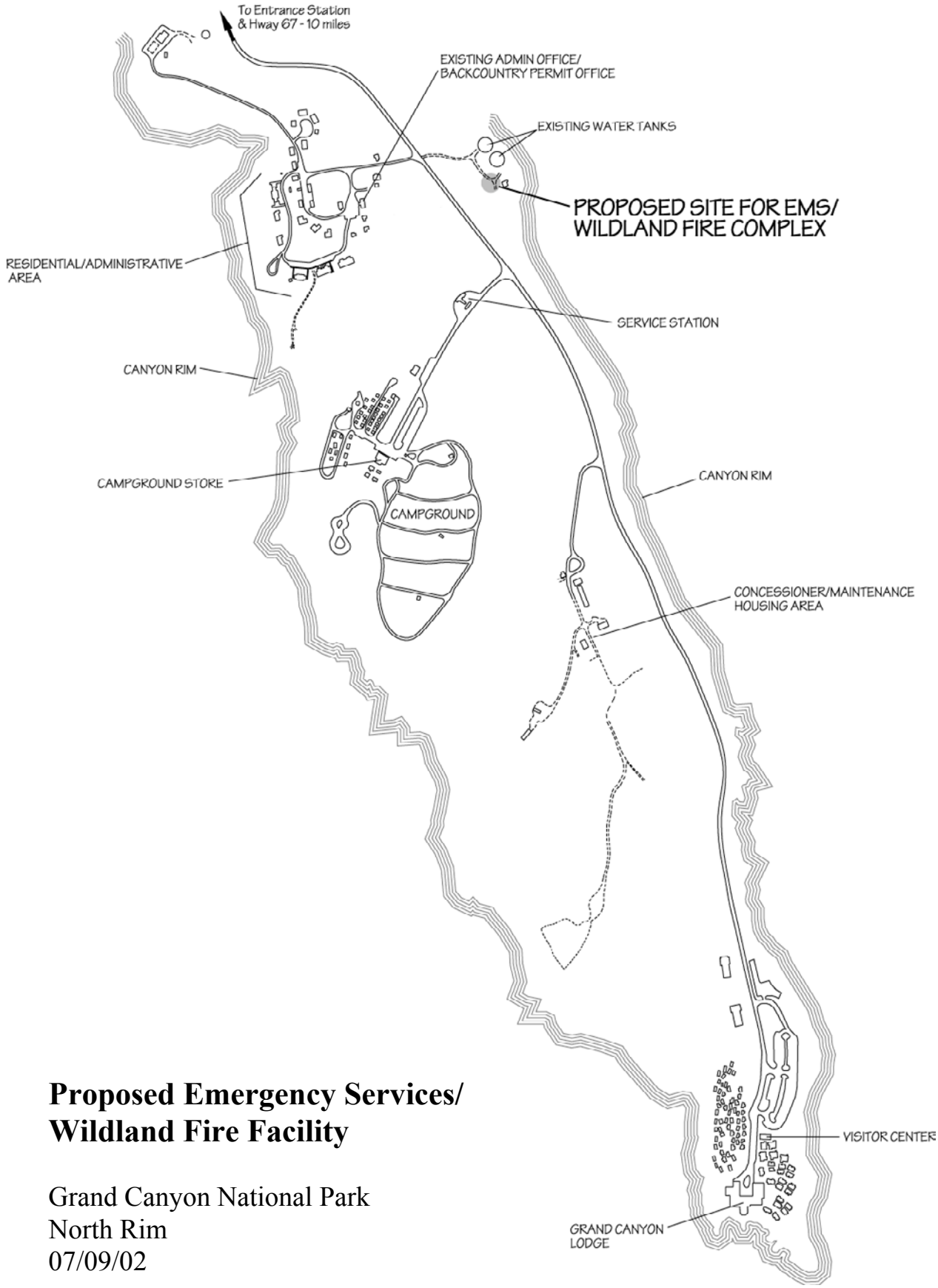
Sincerely,

Joseph F. Alston
Superintendent

Enclosure

cc:
Sara White (GRCA 8213)

If you would like to receive a hard copy of the Environmental Assessment (EA) for this project when it is complete, please contact Sara White at the address above, at (928) 638-7956, or at sara_white@nps.gov, and one will be sent to you during the comment period. If you do not respond to this request, a hard copy of the EA will not be sent to you. However, please be aware that this Environmental Assessment (when complete) and other environmental documents are routinely available for your review on the Grand Canyon National Park website at www.nps.gov/grca/mgmt/



Proposed Emergency Services/ Wildland Fire Facility

Grand Canyon National Park
North Rim
07/09/02

APPENDIX B

PROPOSED PROJECTS WITHIN CUMULATIVE IMPACT ANALYSIS AREA

Appendix B. Proposed projects within the Bright Angel Peninsula sub-unit of the Bright Angel Watershed.

1. **North Rim Administrative Building –** This project would remove the existing administration building (a modular) and construct a larger building at essentially the same site, renovate the existing parking area, and continue to use the existing roads for access to the new building. The new building would be approximately 229 square m (2,467 square feet) and would support the backcountry permit system, visitor contact services, public restroom, and administrative offices. Very little tree removal, if any, would be required for this project, due to its location on the existing footprint of the current building and its associated parking area. The project area is relatively small and is between two residential areas and within the headquarters area where development has occurred and continues to occur. The site is in a small opening in a forest consisting mainly of ponderosa pine and some scattered aspen. Disturbance for this project is estimated at 0.4 ha (1 acre). No trees greater than 12 inches dbh would be removed for this project.

2. **North Rim Emergency Services/Wildland Fire Facility –** A new emergency services/wildland fire facility would be built in the vicinity of the water tanks. The facility would occupy approximately 984 square m (10,590 square feet) and would have EMS facilities grouped at one end of the building, wildland fire facilities at the other, and shared spaces between. EMS facilities would include storage areas for emergency services vehicles (fire engine, ambulance, patrol cars, and suburban), caches for EMS and search and rescue equipment, men's and women's locker rooms, holding cells, and office space. The wildland fire facilities would include storage areas for vehicles, a fire equipment cache, and office, laboratory, and work spaces. Shared facilities would include offices, a conference room, and maintenance facilities. Parking at the facility for staff and visitors would accommodate approximately 15 vehicles. Paved area for parking and roads would occupy approximately 0.4 ha (0.9 acre). All utilities would be connected to the facility underground. The utility trench would be 1 meter (3 feet) wide, and the utility corridor would be 3 m (10 feet) wide to accommodate equipment and sidecast materials. Trenching for these utilities would result in disturbance to approximately 0.06 ha (0.14 acre). The total area of ground disturbed at the site would be approximately 0.8 ha (2.0 acres), and approximately 0.25 ha (0.6 acre) would be revegetated following construction. Approximately 74 trees greater than 12 inches dbh would be removed for this project.

3. **Exposed Frame Cabin Rehabilitation, Restoration, and Reconstruction –** Twenty-six one-room cabins, a shower facility, and a laundry facility in the North Rim Inn and Campground Historic District would be restored, rehabilitated, or reconstructed and would be used to house the wildland fire crew. Project actions will be limited to the buildings themselves and the immediate surroundings and would not require ground disturbance or vegetation removal. No trees greater than 12 inches dbh would be removed for this project.

4. **North Rim Campground Rehabilitation –** This project includes removal of the existing entrance kiosk, construction of a new campground registration building essentially within the existing parking area, resurfacing the roads within the campground, restroom rehabilitation, and installation of a 6-stall restroom and one prefabricated vault toilet at the group site to replace the existing outhouse. Disturbance for this project is estimated at 0.1 ha (0.25 acre). Approximately 4 trees greater than 12 inches dbh would be removed for this project.

5. **North Rim Lodge Road Reconfiguration –** This project would change public access routes to the Lodge. The terminus of the main road would be reconfigured to allow tour buses to turn around and discharge and pick up guests at this terminus, and to restrict passenger vehicle access to the Lodge. The existing road segment between the parking area and the Lodge would be converted primarily to

pedestrian use. Very little new ground disturbance would result from this project, as most work is confined to existing roadways and parking areas. Disturbance for this project is estimated at 0.2 ha (0.5 acre). No trees greater than 12 inches dbh would be removed for this project.

6. **Lodge Road Parking –** The main parking area would be reconfigured to allow for additional bus/RV parking. Disturbance for this project is estimated at 0.2 ha (0.5 acre). Approximately 13 trees greater than 12 inches dbh would be removed for this project.

7. **Visitor Center Upgrades and Orientation Center Exhibits –** This project includes repair of improper drainage beneath the visitor center, refinishing of the building exterior, installation of solar panels on the roof, native vegetation landscaping, and repair and rehabilitation of the existing walkways around the building. A wayside exhibit plan has been created for the plaza area adjacent to the visitor center. Two orientation panels and three to four interpretive panels would be installed as well as a flagpole. Low-level outdoor lighting may be installed as well, but the Park is still evaluating the necessity and feasibility of this component. All work would occur in areas already developed and receiving high visitor use in the summer season. No trees greater than 12 inches dbh would be removed for this project.

8. **North Rim Water Distribution System Rehabilitation –** This project involves upgrading the existing water distribution system, including the addition of fire hydrants and hose houses where necessary. The majority of the existing potable water lines would be excavated and replaced. A pumping station would be upgraded to boost pressure to the administrative area and the campground area. Work would be conducted in previously disturbed areas and along existing utility corridors, many of which are along roads. Tree removal would be minimal, consisting primarily of small seedlings and saplings that have grown up along the utility corridor. Approximately 2.3 miles of water line would be replaced during the course of this project. Disturbance for this project is estimated at 1.0 ha (2.5 acres). Approximately 10 trees greater than 12 inches dbh would be removed for this project.

9. **44-Room Dorm –** A 44-unit, two-story dormitory would be constructed adjacent to the existing RV trailer park and mill shed within the developed area of the North Rim on Bright Angel Peninsula. This dorm would provide critically needed housing for concessioner employees on the North Rim. The dorm would be constructed adjacent to the RV park and in the vicinity of the concessioner dining facility and housing area. These areas are currently disturbed sites that are frequently used by concessions and park employees and are not in areas accessed by the public. The habitat type in the project area is ponderosa pine, with occasional aspen. Disturbance for this project is estimated at 0.8 ha (2 acres). Approximately 20 trees greater than 12 inches dbh would be removed for this project.

10. **Mill Shed Replacement –** This project would remove the existing mill shed and construct a replacement building on the same site, pending cultural resource evaluation and consultation with the State Historic Preservation Officer. This project is located within the concessioner/maintenance and housing area, and adjacent to the site of the proposed concessioner dorm. This area is a disturbed site that is frequently used by concessions and park employees and is not in an area accessed by the public. The habitat type in the project area is ponderosa pine, with occasional aspen. Disturbance for this project is estimated at 0.1 ha (0.25 acre). Vegetation disturbance would be minimal and tree removal is unlikely.

11. **RV Trailer Park Upgrades –** This project would add twelve additional RV sites to the North Rim employee trailer court and upgrade the existing infrastructure. Sites would be added within the boundaries of the existing trailer park, which is located within the concessioner/maintenance and

housing area and is adjacent to the site of the proposed concessioner dorm. This area is a disturbed site that is frequently used by concessions and park employees and is not in an area accessed by the public. The habitat type in the project area is ponderosa pine, with occasional aspen. Disturbance for this project is estimated at 0.8 ha (2 acres). Vegetation disturbance would be minimal and tree removal is unlikely.

12. **North Kaibab Trailhead Restroom –**The existing portable toilet in the upper parking area island would be replaced with a pair of prefabricated vault toilets at the same location. It is likely some rock excavation may be necessary for vault installation. Site work would include removal and replacement of curbing, accessible walkway placement, and installation of accessible ramps to the toilets. The project area is a disturbed site at the existing parking area. Disturbance for this project is estimated at 0.1 ha (0.25 acre). No trees would need to be removed for this project.

13. **Widforss Trailhead Restroom –** No toilet exists at this location. A single prefabricated vault toilet would be constructed at the far end of the parking area in a disturbed area. It is likely some rock excavation may be necessary for vault installation. Site work would include some grading and drainage improvements and construction of a small, drylaid stone wall behind the building. The project area is an existing parking area. This is a small project resulting in little ground disturbance (0.1 ha [0.25 acre]) and is expected to be of short duration (2-5 days for installation). No trees would need to be removed for this project.

14. **North Rim Firing Range Rehabilitation –** This project entails lead abatement at the firing range. The proposal includes measures to remove lead from the site and construct a "bullet-catching" backstop that would eliminate lead contamination on the site in the future. Proposed actions would also include rehabilitation of the existing structures (firing lanes, etc.) The project area is in a quarry, is a disturbed site, and has been in use for many years as a firing range. The lead abatement portion of the project is considered heavy construction, due to the probability that some large pieces of equipment would be necessary to remove the contaminated soil and bring in new soil. Some trees may need to be removed, depending on the level of lead abatement necessary, but tree removal is not expected to be extensive and would be confined to the range and adjacent areas. Disturbance for this project is estimated at 0.8 ha (2 acres). No trees greater than 12 inches dbh would be removed for this project.

15. **Closure of Marble Flats Landfill –** The Marble Flats landfill is an inactive sanitary landfill covering approximately 4.9 ha (12 acres), situated in an open meadow surrounded by ponderosa pine and mixed conifer forest. This project would include capping the landfill with a 15-23 cm (6-9 inch) layer of topsoil, suitable for reclamation of the site. Because this project is reclamation of an existing disturbed site, the 4.9 ha (12 acres) of ground "disturbance" for this project was not considered modification of habitat and was not factored into the total amount of ground disturbance for all of these projects combined. No trees greater than 12 inches dbh would be removed for this project. This project was completed in late 2002, during planning for the emergency services/wildland fire facility and the preservation treatments of the exposed frame cabins.

16. **Closure of Lindberg Hill Landfill –** The Lindberg Hill landfill is an inactive landfill covering approximately 2.0 ha (5 acres). It was once used as a stone quarry before its use as a landfill and is also surrounded by forest. This project would include capping the landfill with a 15-23 cm (6-9 inch) layer of topsoil, suitable for reclamation of the site. Because this project is reclamation of an existing disturbed site, the 2.0 ha (5 acres) of ground "disturbance" for this project was not considered modification of habitat and was not factored into the total amount of ground disturbance for all of these projects combined. No trees greater than 12 inches dbh would be removed for this project.

This project was completed in late 2002, during planning for the emergency services/wildland fire facility and the preservation treatments of the exposed frame cabins.

17. **Arizona Trail –** This project would construct a small segment of new trail between Forest Service land and the park boundary to connect two existing segments of the Arizona Trail. New trail construction would be limited to approximately 2.4 km (1.5 miles) out of an approximately 17.7-km (11-mile) segment between the park boundary and existing roads and utility corridors. Some tree removal and ground disturbance would be necessary for the 2.4-km (1.5-mile) segment, near the entrance station. Disturbance for this project is estimated at 0.4 ha (1 acre). Approximately 6 trees greater than 12 inches dbh would be removed for this project. This project does not occur within the Bright Angel watershed sub-unit.

18. **North Rim Entrance Station Rehabilitation –** This project is adjacent to but not within the Bright Angel Peninsula subwatershed. This project would rehabilitate the historic entrance station and surrounding area. A specific proposal has not yet been developed fully, but actions likely to be included in the project are reconfiguration of the road and parking area, replacing the entrance sign and gate, installation of visitor orientation signs, constructing a restroom, and rehabilitating the existing historic building including upgrading the security and HVAC systems. The North Rim entrance station is located in an open meadow, although trees are within close proximity to the entrance station in some areas. The majority of the work would be focused on the upgrading the existing development at the entrance station and would not result in substantial new ground disturbance outside of the immediate developed area. Disturbance for this project is estimated at 0.8 ha (2 acres). Approximately 5 trees greater than 12 inches dbh would be removed for this project.

19. **Repaving Cape Royal Road to Point Imperial Spur –** This road maintenance project would include pulverizing existing asphalt and overlaying new asphalt. Work would total approximately 9.7 km (6 miles) of road. The surrounding habitat along some sections of this road is mixed conifer, and much of this area was burned in the Outlet Fire. Widening the road will be required at some culvert locations where the road is narrower than elsewhere. Incidental improvements to guardrails and drainage will be needed. Implementation of the project may include some vegetation disturbance where slight widening is necessary near culverts. Disturbance for this project is estimated at 7 acres, approximately 5 acres of which occur within the Bright Angel Peninsula sub-unit. Approximately 5 trees greater than 12 inches dbh would be removed for this project.

20. **North Rim Development Plan –** This planning effort is addressing options for improvements in visitor orientation and interpretation for the North Rim, to implement the Park's General Management Plan. This plan is still in its initial stages, and specific project components have not been identified.

21. **Prescribed Fire –** Over the next five years, prescribed fire is planned for 405 ha (1,000 acres) in 2004 and 202 ha (500 acres) in 2006.

22. **Fire Sprinkler Systems in 13 North Rim Buildings** – This project would add structural fire sprinkler systems to 13 buildings on the North Rim, equating to approximately 1,394 square m (15,000 square feet) of protected floor space. At this time, none of these buildings have sprinkler systems and need protection. Eight of the structures are listed on the National Register of Historic Places, and all 13 are located within the administrative area of the North Rim developed zone. Structures to be sprinkled include 5 non-historic residences, 7 historic residences and 1 historic office building (the ranger operations office [building 119]). Project actions would be limited to the buildings themselves and the immediate surroundings and would not require new ground disturbance or vegetation removal. No trees greater than 12 inches dbh would be removed for this project.

23. Computer Network Upgrading – This project would establish a network infrastructure that will interconnect the Ranger Operations/Interpretation building, the Holding Facility, the Community Building, Generator Building, Water Treatment facility, and the Heliport using wireless technology. The primary issue is the need to attach small antenna to three historical structures (Ranger Ops/Interpretation, Holding Facility, and Community Building). This is a small antenna, which is 16.5 cm (6.5 inches) long and 1 cm (2.5 inches) in diameter. Some trenching between existing buildings would also be necessary to upgrade the network. Trenches would be in existing disturbed areas between buildings in the maintenance area of the North Rim. Disturbance for this project is estimated at 0.1 ha (0.25 acre). No trees greater than 12 inches dbh would be removed for this project.

24. Greenway Trail – The Park is exploring options for establishing a section of the Greenway Trail system in the developed area of Bright Angel peninsula on the North Rim. The Greenway trail system in the Park is being designed to provide non-motorized routes of travel to lessen traffic impacts and to provide another means of traveling to visitor destinations on foot, by bicycle, or by wheelchair. Although the planning for this trail on the North Rim is in its early stages and a proposed location for this trail segment has not yet been determined, it is thought that it would likely parallel the North Rim Entrance Road (Highway 67) and follow existing disturbed areas wherever possible to connect the North Kaibab Trailhead, Bright Angel Lodge, and the Transept Trail.